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THE MAGAZINE FOR INFORMATION EXECUTIVES

COVER STORY

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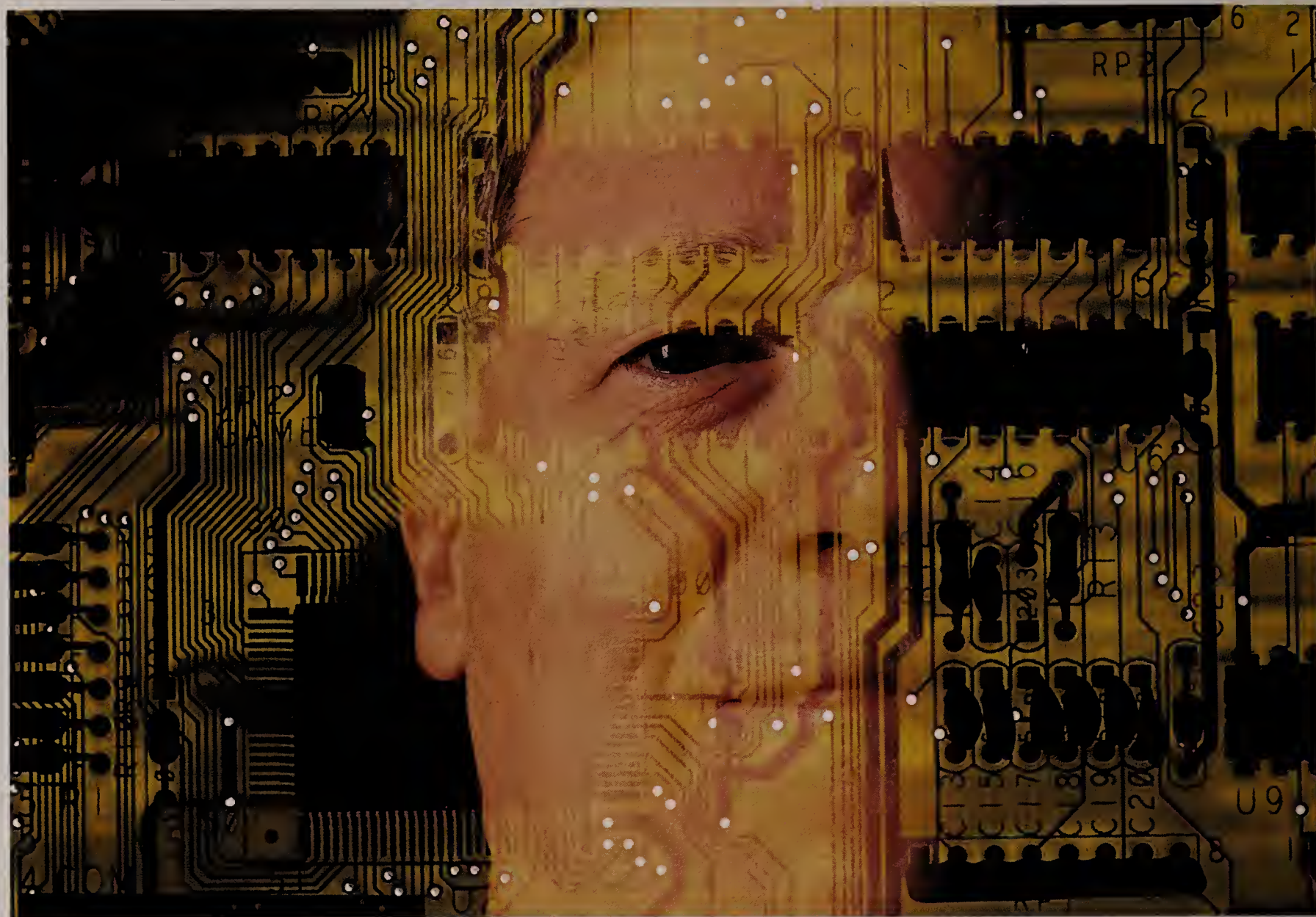
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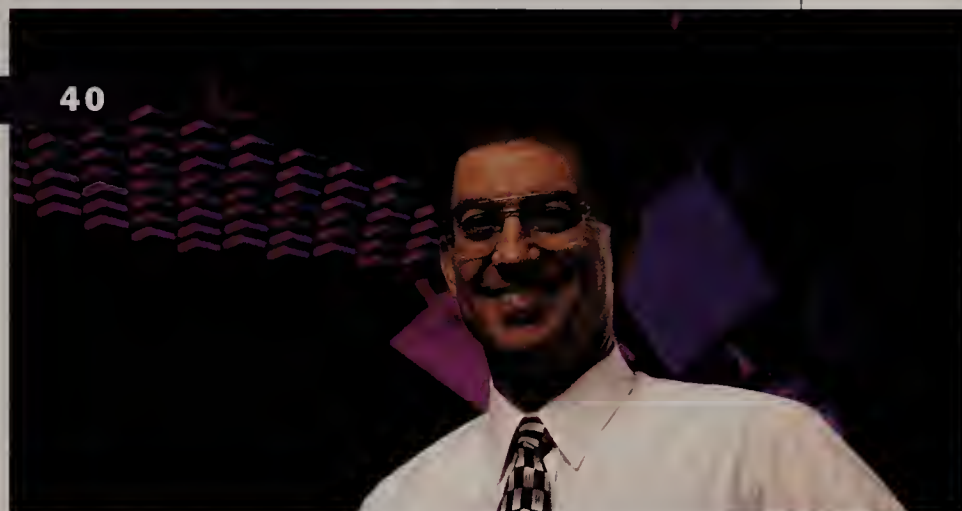
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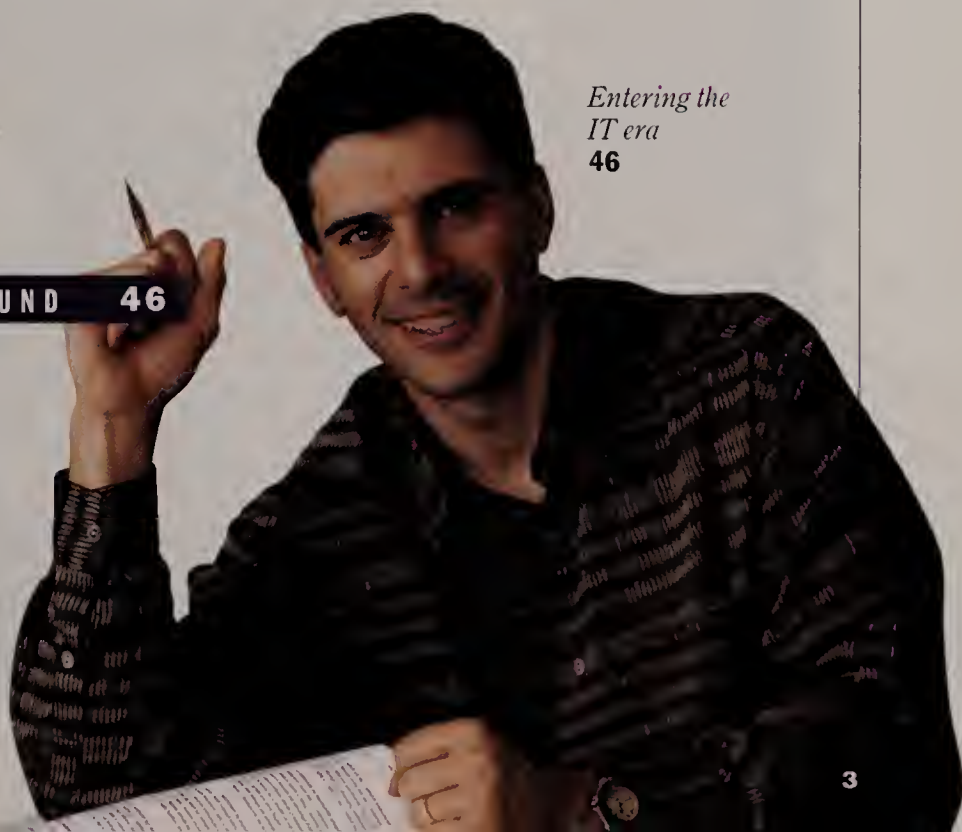
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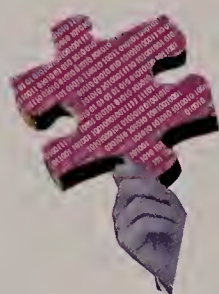
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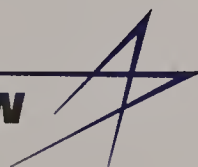
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IS executives are frequently charged with effecting significant organizational change. The obvious reason these assignments fall into the CIO's lap with such regularity is that they so often involve the use of information technology. But as most readers of *CIO* can attest, the technology is usually the easy part; there's lots of great hardware, software and communications technology out there to help your company do what it needs to do. The hard part is determining (or at least understanding) organizational goals, enlisting the CEO's support, communicating well with

function heads and actually getting people to change their behavior. After all, new systems boil down to either performing new work for the first time or performing existing work in a different way.

But just as there are procedures to help simplify and rationalize the IT purchasing process, so are there effective methods for succeeding in these other areas. Unfortunately, some methods *are* madness, and it can be hard to know whom to trust. We've observed that first and foremost, CIOs look to each other for advice. That was the idea behind our Second Opinions feature (please see Page 46), in which an IS executive presents a challenge he or she is facing and a handful of people who have been through similar experiences respond.

We are currently looking for more ways to provide you with reliable, experience-based advice, and we're working to get more CIO voices into the magazine. In our last issue, we began testing a monthly page of reader letters. We're also in the early planning stages of developing some new editorial content, and we expect our Web site (<http://www.cio.com>) will provide an excellent forum for peer-to-peer networking. Stay tuned!

We count on you to let us know what topics you'd like to see covered and for feedback on how we're doing.

Editor
lundberg@cio.com



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Business today has a major problem

Business management is searching for a competitive advantage in a continuously changing world. It needs information not data, and perceives IT as an important part of the solution to its problems. The biggest mistake business managers can make when planning new IT systems is to focus exclusively on delivery timeframe and delivery cost. Because today's business climate is characterized by constant change, the most significant cost of an IT system is the cost to the business when that system is unable to rapidly accommodate future changes.



“

But the IT organization has problems of its own

It is often unable to respond to the speed of change, because existing systems have been developed using techniques that are unable to rapidly adapt to today's changing business needs. Consequently, when systems are delivered, they are often late, do not reflect current requirements and cannot be updated without significant amounts of reengineering.

By exploring such issues as model-based development, component-based development, rapid application development and reuse in its broadest sense, we hope you will understand why we firmly believe that to retain your competitive advantage, you need to ensure your company's business rules can and should change independently of the underlying technology.

Businesses increasingly look to their information systems to provide them with a unique competitive edge.

This competitive edge will be provided by systems that deliver useful, up-to-date, reliable, consistent and accurate information to the business - in a world of constant change.

”

How?

How can you ensure today's client/server systems are not tomorrow's legacy systems?



"There are many reasons for failures occurring in client/server projects. One of them is inappropriate use of tools and technology, or what IDC calls 'little client/server' type tools, which have difficulty scaling up the enterprise."

Jonathan Steel
IDC

■ There has been a recent backlash against the notion that small client/server systems, developed rapidly using tools that support individual workgroups, are the answer to every business need. Managers have found that tactical approaches used inappropriately lead to even more legacy systems, even greater skill and resourcing problems and inconsistent applications that actually inhibit future business flexibility.

The key issue for business and IT managers today is how to evolve their portfolio of core business systems into new technologies, such as the Internet, achieving a sensible balance of quality, speed and flexibility, delivering applications which meet the business needs now and in the future. We will examine how model-based development, supported by Composer from Texas Instruments Software, provides an environment for application developers that supports this balance of quality, speed and flexibility. And how some package vendors deliver real flexibility to their customers using these techniques.

■ **Beyond little client/server**
Page 6

How?

How can a package provide the same level of flexibility as a custom-developed application?

"The single most effective countermeasure that can be taken to reduce the pains of constant change is to let applications and their enabling technology change independently from one another."

Paolo Magrassi
Gartner Group

■ A common response to reducing the risk involved in acquiring information systems to support the business is to acquire a specific package. Packages are considered valuable, because it is believed they can be deployed quickly to support well-defined business functions, such as payroll or general ledger. But when they are applied to other areas, business is forced to accept a less than optimal solution, because organizations must change their business process to the capabilities of the package. It is difficult to modify packages to enable organizations to capitalize on unique business opportunities that provide that elusive competitive advantage. In fact, custom-built strategic applications are essential to maintain a competitive edge.

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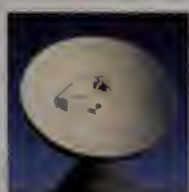
How?

How can you shorten the application delivery lifecycle?

■ Focus on speed of delivery alone and you will deliver low quality results in less time. The very latest approaches to rapid application development enable fast delivery of complex applications with exceptionally high quality. Although business users require prompt delivery of their IT support systems, they demand higher and higher levels of business support.

Very often the primary business driver is the time to market of new products and services. The IT systems required to support these new products or services are usually on the critical path to meeting new business demands.

■ **Shortening the delivery lifecycle**
Page 11



What?

What is the most effective way of extending the application development footprint?

■ The manufacturing industry long ago learned about the benefits of moving from custom development to assembly from prefabricated components. First, they reduced costs and time to market by building from pre-built, ready tested components. Second, they added value and differentiation to their products by rapid customization. Since this approach has suited industries ranging from building construction to electronics, it can now work for software applications. We call it, Component-Based Development (CBD).

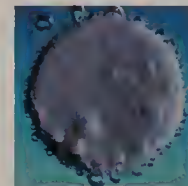
■ **Assembling applications from components**
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“Rapid application development sounds good. But it doesn’t quite hack it. You need rapid, adaptable applications, because life changes after an application has been delivered.”

Henk Bakker
OVUM

“The failure to build enough quality, flexibility and reuse into application systems leads to disparate islands of automation with inconsistent data and business rules, high IT staffing costs and slow responsiveness to change requests. IT organizations that fail to communicate and resolve this issue may find they have dug a hole from which they cannot climb out.”

Mike Blechar
Gartner Group



Beyond little client/server

■ How can we ensure today's client/server systems are not tomorrow's legacy systems?

Many organizations are beginning to derive real business benefit from developing IT systems on client/server platforms. They attribute this success to their ability to deliver systems rapidly using modern, highly graphical desktop development tools. But will they prove to be sufficiently robust and maintainable to support the business now and in the future? Or are they simply tomorrow's legacy systems? Two factors are crucial. First, is the need to maintain independence from any underlying technology. And second, is the need to use tools and techniques that will enable systems to be built that are sufficiently robust to be used enterprise-wide. It is crucial that these applications are able to adapt and scale up as the needs of the business change.

■ How can we build more flexibility into client/server applications?

Consider your reaction if you were able to deliver integrated applications in half the time it takes using conventional development approaches and also deliver high-quality, high-performance applications that are inherently easy to modify and maintain. You can with an advanced model-based development environment, such as Composer from Texas Instruments Software.

"Composer takes away all the difficulty of the communications and coordination between the developer of the client and the developer of the server procedure. You can have one developer developing the client and the server with Composer. It's a big advantage."

Vincent Ducrot
Schweizerische Bundesbahnen (SBB)
(Swiss Railways)

Model-based development

■ Model-based development separates the business concerns from technology and enables high levels of reuse of both the specification and execution components.

■ Business level specifications are independent of technology

In model-based development the application specification is defined as a technology-independent business model using a series of diagramming tools. For example, consider a model of the business rules and data collected when recording a sales transaction. Most of these rules and the data are the same whether the transaction is made in a store on a point-of-sale system, entered into an on-line telesales system or executed independently by the customer over the Internet.

In an advanced model-based development environment, such as Composer, the specification of the system is stored in a repository as a model of the business. So, when changes are made in the business, these can be quickly reflected in the specification and a replacement component generated.

Composer uses a highly graphical approach. Each of its diagramming tools provides a specific view of the complete specification which is captured in the repository. Together, all the views are integrated to provide a complete business model that can be rapidly built in an iterative manner, with overall consistency and integrity coordinated through the repository.



"The business world cannot afford to stop and ponder the risks of building the next generation of legacy systems."

Paolo Magrassi
Gartner Group

"If organizations are still embedding their business rules in program code, they will be incapable of reacting to business and market pressures, and it may be that as a direct consequence of this that one day they will no longer be in business."

Martin Butler
Butler Group



■ Specification - a guaranteed fit

In Composer, model-based development should not be looked upon as a collection of separate tasks, but as different ways of entering and viewing business object information. As each view is from the repository, it ensures a guaranteed fit between the information entered through each of them. This reduces errors as no translation or re-keying of data between views is required. It also means that the specification exactly matches the execution code, making maintenance dramatically simpler.

■ Moving on to system design and implementation

The business level view focuses on what the business does. The design level concentrates on how to accomplish these tasks within the business. The design level is concerned with two areas - external design or what the user sees, and internal design, including database structures.

■ Automated system production and deployment

Coding and deployment of the business system is technology dependent. But the model-based specification provides all the details necessary to enable the application components to be automatically generated, including the source code, the database and the communications components.

The good news for business and project managers is that the model-based development approach facilitates a quantum improvement in application development performance, both in the delivery and maintenance phases.



Repository - the essential enabler

■ A repository is simply a database that knows the structure of applications. It knows about all the software components from which applications are composed. It knows about the business models from which the applications were derived. And vitally, it knows the relationships between the components. It is this last capability that places the repository into a pivotal role in the application management process.

Developers use the Composer repository to store all elements of design. It consists of descriptions of an application's components, such as business process logic, business events, object types, program interfaces, database schema, etc. The main role of the repository is to assist application designers to share information. To do this, it supports version, configuration and relationship management. Composer's repository provides an environment to support everything from the smallest workgroup to the largest enterprise. It enables numerous integrated applications to be coordinated, sharing specification-objects and executable-objects and achieving a very high level of reuse and consistency.

Leading edge repositories that store all the specification components necessary to automatically generate 100% of an application also provide the very highest level of automation for the developer. Each item of knowledge is stored only once, and the relationships between different views are well defined.

"Repository technology is the key enabler of automation. Without a repository, software development remains an inconsistent, craft-based activity. With a repository high levels of reuse and control can be exerted in a distributed manner."

Repository technology is vital; the establishment of a standard is essential for the widespread availability of application components. It is likely that the work being done by Microsoft and Texas Instruments will establish a de facto standard."

Martin Butler
Butler Group

■ New developments in repository technology enable component-based development

Repository technology is the primary driver of the next important evolution in IT; it enables the widespread deployment of components. The next evolution in repositories will focus on increasing levels of openness and application run-time support. This will enable IT departments to provide business users with access to components without the need for assistance from technical specialists.

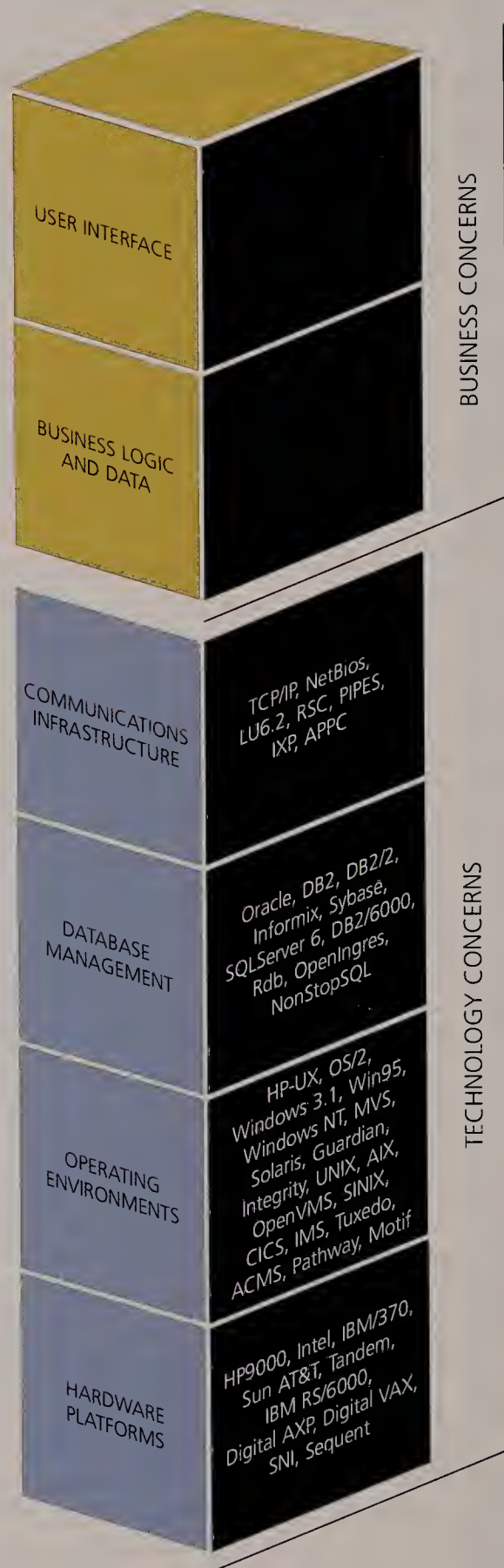
Modular architecture for real-world flexibility

■ One of the key aspects of client/server development is the distribution of the parts of an application, such as the database, user interface and business logic. Applications consist of many parts, and the challenge of client/server development is that these parts are distributed between the server and its clients. Good programming practice has always encouraged a modular approach. But this becomes critical in delivering client/server applications because the parts are separated physically as well as logically. Many organizations are faced with distribution of these parts across very complex client/server environments with many different platforms, databases and networks. And they need to allow it all to change to keep pace with rapid technological evolution.

With the client/server model, the natural layers of the application, if developed independently, provide isolation from technology change. For example, changing networks should be straightforward if middleware is used to connect the client and server together. Changes in the user interface should only affect the user interface code. And new software or hardware can be introduced without having to change the entire application.

Break free from technology

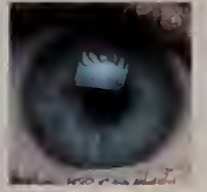
■ Composer's approach to system delivery and deployment is based on 100% system generation directly from business-level specifications. This provides organizations with a vast degree of choice when it comes to the technology they choose to run the application. Composer's list of supported platforms, operating environments, database management systems and networks (shown right) is truly impressive.



"We train our staff in Composer - we don't have to train them in six different technologies. We don't end up with a fragmented sort of staff where we have one expert in one tool, a different expert in the other tool and a third expert in a third tool. Instead, each of our development people can basically do the whole job with Composer. It's a very powerful concept for us."

Steve Vance
Travelers Insurance





Netting the benefits

■ Internet application capability

In its simplest form, the Internet can be viewed as a wide-area client/server system. For business users, the Internet represents a powerful application tool.

Web-style client/server applications are usable as inter-company applications using the Internet or as internal applications commonly termed 'Intranet.' The Intranet applications utilize the internal corporate network as the network between the browser and the servers, delivering the same look, feel and benefits of external Internet applications.

Developing for multiple client platforms is easier with Web-style clients, since the pages and software downloaded by the Web browser are client platform independent.

In the same way mainframe customers were able to adapt Composer applications to conventional client/server applications, existing server applications will be accessible as Web pages on the Internet, integrating a new and innovative client into customers' overall client/server architecture. Most Composer users are in the unique position of having implemented an application architecture which separates business logic into server-business objects or components. By isolating the client type from the server-business objects, the different types of client can be used to access dynamic server-based information.

Texas Instruments Software is working to bring tools and solutions to allow its customers to develop Web-based applications delivering Internet for the Enterprise.

Communications infrastructure

■ An essential component of any architecture supporting large-scale client/server systems is a robust and flexible communications infrastructure. The communications infrastructure provided by Composer supports a wide range of platforms and protocols transparent to the developer, including transaction processing protocols, such as CICS or Tuxedo.

Composer also supports:

- Internet
- Native protocols, such as LU6.2, NetBios and TCP/IP
- Database protocols like SQLNet
- The PIPES middleware product from PeerLogic

In a complex network, it is not unusual to have a combination of two or more protocols. With Composer, changing or adding new protocols does not require the entire application to be modified or rebuilt. Simply make the appropriate change to the model and regenerate the affected parts.

In order to manage the growing complexity of enterprise-wide networks, organizations are looking to implement communications infrastructures based on the higher levels of service provided by products, such as the OSF's DCE and IBM's MQSeries. Texas Instruments Software is opening up the communications interface to Composer, enabling customers to use the interface of their choice. This approach allows organizations to select the most appropriate communications infrastructure.

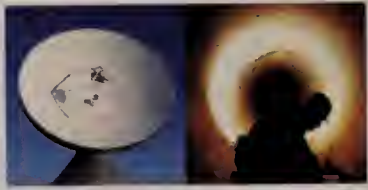
Organizations will be able to realize the benefits of Composer-developed applications knowing that the applications will co-exist in a highly flexible manner with the chosen infrastructure. As distributed client/server technology evolves, Composer will allow the initial adoption of a particular infrastructure, insuring it can be changed

progressively over time as distributed client/server technology evolves.

In fact, current Composer customers are already redeploying their Composer-developed applications using the Internet as their communications alternative. Since Composer users design and develop applications without having to make firm decisions about the operating system and hardware platform, the same level of technology independence is provided in the distributed communications area of the products.

"Texas Instruments is making a nice push into the Internet by enabling Composer to provide some avenues for organizations to develop Internet applications and applications that have Internet components."

Dave Kelly
Hurwitz Consulting Group, Inc.



Looking at packaged software in a new light

"Packages tend to be lowest common denominator solutions. That's fine if you're doing it on non-core business.

We find we spend as much money on tailoring the packages to suit our process as we do buying the package."

Brian Giffen
British Telecommunications plc U.K.

■ Many IT organizations are faced with pressure from the business to acquire and manage an 'off-the-shelf' package to support a specific business need. The perception is a package will generally provide a fast solution, and it is usually the best option for automating a well-defined, non-competitive business function, such as payroll or general ledger. But in other areas they can only be deployed at a considerable compromise in functionality. Off-the-shelf packages always require some modification, either to make them fit a specific business environment or to provide a unique function needed for a competitive edge. They are costly to acquire and much of the cost of ownership, such as the cost of modifications, is hidden.

■ Business models - why re-invent the wheel?

A model-based approach to development provides all the advantages of an off-the-shelf package - with none of the disadvantages, particularly if the application can be acquired as a fully specified, up-and-running model of the business requirement - an application template.

Such a model can be rapidly and easily adapted to suit the needs of a specific business and enhanced to provide functionality that gives unique features for competitive advantage. And it can be deployed in a variety of different platforms and computing styles. Because it can be re-partitioned, it is also scalable as the business grows, requiring better performance, higher transaction volumes or more user access.

Today, there are more than 12,000 developer-years invested in a huge range of application templates delivered as business models across the world. Many of these models represent complete applications, ready to be deployed in any number of environments using Composer's 100% code-generation capabilities.

Continuum

Continuum SICS, part of the Continuum software group, is focused on providing IT-based expertise to the insurance and reinsurance market. The SICS application has established an undisputed position as the market leader in Europe.

Technological advancements, especially within development tools, have initiated a major development project to totally remodel the SICS application for client/server technology. The application will be called SICS/nt.

SICS/nt, a Composer-built application, can be updated and tailored with comparative ease and in a flexible manner. This will benefit the end user, the insurer/reinsurer, in that their unique business circumstances can be addressed very rapidly.

CONTINUUM SICS

"Through the use of Composer and the Composer-built template, we were actually able to deliver on time two major phases of the order-to-cash project. And much of our analysis has attributed that success to the efficiencies, the effectiveness and the productivity of Composer."

Chris Dufner
Monsanto

Shortening the delivery lifecycle

Traditionally, a model-based approach has been associated with a 'waterfall' lifecycle, where the entire system's requirements must be analyzed minutely, before any application can be developed and delivered to the business. 'Fast delivery' is not a phrase normally associated with this type of development process. However, a model-based approach, supported by a fully functional repository and high levels of automated system generation, offers the very best environment for Rapid Application Development (RAD).

■ What is RAD?

Rapid Application Development approaches have some key characteristics:

- Incremental delivery of the final system
- High levels of automation
- User involvement throughout the development process
- Development by a small empowered team making use of intensive workshops to drive requirements and translate them into working software
- Reuse of existing software before building from scratch wherever possible

RAD epitomizes the need for IT organizations to become very closely aligned with the business. It includes techniques to translate requirements directly into systems which implement business processes. It requires tools that insulate developers from underlying technology - because they will only have time to consider things that directly translate into business benefits. Additionally, RAD supports delivery of high integrity systems that are adaptable to business change.

■ The role of repository and automation

One of the key features of a repository is that information about the system to be delivered is stored in one place and one place only. So a small empowered team is able to add facts to the repository in any one of the views of the application's model

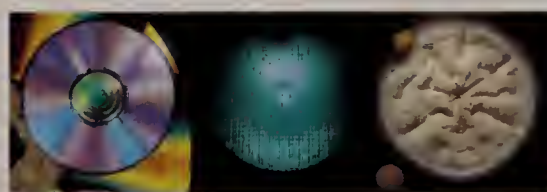
simultaneously as they become apparent during intensive development workshops. The overall integrity of the model is maintained by the repository. This also means that applications can be delivered incrementally, with confidence that each new delivery phase will be fully compatible with previous deliverables. Automation is also important. It means that the RAD team can focus exclusively on business issues and delegate the technology concerns to Composer, which is optimized to exploit the full power of modern client/server environments. Composer's capability to perform 100% system generation directly from the business model is critical in isolating the developer from technical concerns.

■ Prototyping

Because the business model is directly translated into a working system, RAD teams can exploit the capability to generate working prototypes in a local workstation environment before deploying on the more complex environment required by the final system. Business users are encouraged to interact with the prototype and work to refine requirements in the business model at an early stage in the project.

"Our decision to go ahead and use the Composer-generated template was based on several factors. First, we could produce the new system cheaper and we thought quicker than the packaged alternative or even an outsourced alternative. Also, it fits in with the architecture we had adopted."

David Tomsett, Zurich Insurance



Assembling applications from components

■ Learning from industry

Most people with limited knowledge of the software industry are amazed when they learn that business applications are usually custom built! The concept of componentization was successfully implemented long ago in many other industries, but has eluded commercial business application software.

Users of model-based development approaches discovered some time ago that a business model is an ideal vehicle for building application systems. The idea of the business model as an 'application template' has been used to great effect, harnessing the two key factors inherent in the business model - the ability to quickly understand the business functionality through the high-level specification and the ease of customization that this approach facilitates.

■ Component-based development

More recently these same characteristics have evolved into the component-based development approach which provides a fundamentally improved basis for the scoping of applications. No longer is the scope of the application based on the current requirements or business budget but on the services that are required by the business.

Component-based development is the next generation of application development approaches. It embodies key principles of object orientation while minimizing the risk of a pure object oriented approach. This is accomplished by using robust modeling tools like Composer and applying the concepts of encapsulation, data abstraction, rapid prototyping, inheritance through imbedding and 'plug and play' at the desktop.

Composer from Texas Instruments Software supports component-based development. Models of encapsulated business services

can be captured in the repository, and code generation facilities turn these high-level business specifications into operational software components. These components, in turn, can be deployed into client/server systems.

■ Avoiding islands of automation

The introduction of client/server computing and business process reengineering has resulted in system development being spread widely throughout the organization. This is advantageous, because it helps technologists to closely align with the needs of the business. This natural evolution, however, has established islands of automation - pockets of developers using a variety of different, non-integrated technologies to build tactical applications to support their own business unit's immediate needs. Component-based development avoids this by enabling development organizations to be aligned with their businesses in a controlled fashion.

■ A new approach to delivering information systems

Central IT organizations very often become buried under a backlog of requests to modify existing systems and demands to build new applications for business users while attempting to keep pace with a constantly changing environment.

Component-based development represents a significant evolution on traditional techniques for developing software systems. Imagine a world where business units are able to respond quickly to new challenges and rapidly changing markets, and they are empowered with the flexibility to act quickly on innovative ideas. What if they are able to work together with technology specialists in a common process to deliver the information systems needed to drive the business?

Component-based development relieves the pressure on central IT organizations,

allowing them to reduce the development backlog and concentrate on provisioning an information architecture that works and tools that put that infrastructure to best use.

Once an inventory of components exists, a new kind of application development approach emerges. Component builders provide fully-tested components to satisfy more complex business needs, while others less skilled in IT may assemble applications from the available components.

■ Business and technology specialists working together

Central IT developers who are proficient in the modeling of business rules focus on building or buying software components for use in enterprise-wide applications. These components can then be reused in other applications to support a specific business area. Departmental developers or end users who understand the tasks required to support the business can take advantage of these components, assembling applications for their business units.

In addition, business units can take advantage of these components as they build smaller, tactical systems using their desktop productivity tools, such as Microsoft's Visual Basic or Excel. This capability is enabled by using Composer to create software components that conform to the OLE connectivity standard, which is supported by a wide range of desktop applications. The Arranger tool from Texas Instruments Software then allows business units to use OLE-compatible desktop tools to assemble applications that safely access server-based software components.

■ A new way of delivering packaged software

Software packages will undergo a major change over the next few years as a new market emerges around components - up-and-running business service support systems that are understandable by end users and technical specialists alike. In fact, Texas Instruments and Microsoft have formed a partnership to establish a framework for application development and design of the supporting repository.

"Most of those people who will be doing application development using component-based design methodologies are not going to be C++ programmers. They are never going to have those skills and they are probably never going to need them."

Jonathan Steel
IDC

Building good software components

■ If organizations are to benefit from assembling information systems from components, they must first learn how to build good components.

■ Is source code a good component?

Software components are usually described in source code. But can source code be used to describe good, reusable software components?

When we consider code reuse, we often think of C++ classes, which are low-level programming components. These components are detailed in a manner that is incomprehensible to the business user. These building blocks are the rivets, nuts, bolts and gearwheels of the object revolution.

But they do nothing to put the development power where it is needed most. If the business user is to be involved in the application development process, then the components of the application must be clearly recognized and understood in business terms. Business users need the whole parts, connected by these rivets, nuts and bolts.

■ Modeling components

A modeling component exists not as a piece of executable software, but as a model of the business. Modeling components represent business items and business rules. They are understandable and recognizable in business terms. Products, such as Composer, are focused on building models of the business that are a rich source of reusable components.

Though modeling components may be understandable by the business, they still need to be turned into software components and plugged together into a system before they can actually execute. Business users do not understand this process. Developing good components is the key to successful and widespread reuse.

They must be understandable and usable by both developers and business people alike.

In model-based development, IT specialists get significant benefits if business models and software systems are linked together through a repository like Composer's. In the world of software components we call this link the business object.

"Texas Instruments is doing some very exciting things in the field of applications development and the whole technology landscape. Their products, such as Composer and Arranger, allow IS organizations to start to make the move into component-based development and develop applications that are not monolithic, but instead are composed of components that can be used with other existing desktop and Windows-type applications."

Dave Kelly
Hurwitz Consulting Group, Inc.



Business objects

■ Business objects are large-grained components that represent something business people deal with in the course of doing their jobs and offer a service that is understandable at a business level. They hide details of implementation, exposing only the information that is relevant. If you sit with a business user and discuss a customer, you talk about a service, such as 'check credit rating.' The user of the business object doesn't need to know that the operation is a CICS transaction executing on a remote server.

With business objects we have components that are truly useful. They are understood by the business, and because they hide the details of the underlying technology, business units can more easily build their own systems by plugging them together using a variety of techniques facilitated by Composer and Arranger, available from Texas Instruments Software.

■ Looking after the corporate data asset

Business objects take responsibility for the integrity of the corporate database, because the only way users interact with the database is by using one of the services of the business objects. Using the business object concept allows insulation of the corporate database from application assemblers. By building appropriate security into the business objects' services, control and security are retained when the component is published for widespread use.

"Components are up and running business objects that can be strung together by end users to build applications. So this level of reuse is aimed at end users rather than programmers, and for this reason alone are more likely to succeed."

Henk Bakker, OVUM

Empowering the enterprise

■ A new approach to information systems delivery is required, which empowers individual business units to take control of their own information needs. But at the same time enabling central IT to retain control of essential criteria, such as quality of solution, downstream maintenance resources, likely fan-out requirements and protection and integrity of enterprise data.

Arranger

■ Arranger, from Texas Instruments Software, offers an extended capability to model-based development. It brings remote business objects onto the PC desktop and makes their services accessible by desktop productivity tools. Using the business object concept, professional developers use Composer to generate the databases and program code. Having created and tested the software components, they are published in Arranger's catalog for reuse at the desktop.

Business units can then browse the catalog to select business objects to satisfy a need and assemble them into an application. Arranger shields the business user from the underlying technology by automatically attaching the remote information service to a familiar desktop application tool, such as Microsoft's Excel or Visual Basic using OLE automation.

■ Relieve the pressure on central IT departments

A great deal of development and delivery workload on tactical information systems will be removed from the IT department and repositioned with the business unit's own developers and end users.

■ Widespread, secure access to the corporate data asset

Because the components that will be reused in applications developed by business units have been developed by IT professionals as software components, they will be high quality and cannot in any way threaten enterprise data integrity.



"Arranger is like the super glue - I can snap in and snap out objects to it, and I'm going to give my team a new life in this world where different technology teams are advocating different solutions. Arranger allows different development communities to have a foundation where they can move their development head on with confidence that the data is valid by using a Composer server routine, guaranteeing that the business rules are being enforced when that data is displayed or updated."

Olis Garber
Blue Cross and Blue Shield of Florida

"[OSIRIS] is a very mission-critical application. The bank would just stop if it didn't work."

Pierre Pennone
Unicible

■ Component warehouse

So, what types of applications should be developed this way instead of using a formal model-based approach? It is when business units have an immediate need for information at the desktop for local decision support, such as ad-hoc retrievals or reports. This could be thought of as a component warehouse. The component warehouse goes further than data warehouse, because it provides business users direct, safe read-and-write access to corporate information and business processes. The business units do not have to engineer their own access to corporate data - and can execute a decision based on local information analysis by directly updating the corporate data model.

"We believe Arranger will allow the end users access to data in a controlled way. They can then manipulate, massage, print, or report the data however they want without having to call IS for help."

Skip Kapur, Ericsson Data Services

Gaining competitive advantage from information systems

■ Managing a dispersed development environment presents something of a challenge. How do you organize a business unit IT staff to take advantage of new techniques for solving their own information needs? And how can a central IT organization best support the business units, while protecting the corporation's information asset and providing an information system architecture that is flexible to support changing business needs?

■ Managing the development organization

The whole organization will need to evolve into a structure and culture where central developers, department developers, information workers and end users work together in a common process. The main focus for central developers will become architecture control - networks, hardware, operating systems, databases, tools and methods support. Plus the provision of enterprise-wide applications - those software components or systems that are used by multiple business units.

Technology center teams will work in an advisory capacity helping all application developers, central as well as departmental units. Central application developers and the departmental business unit developers will work closely together to ensure that the enterprise-wide systems meet the needs of the business. Finally, departmental developers will work with their business users advising them on how best to satisfy their own information needs.

■ Reengineering the information delivery process

Organizations will require help in how best to reengineer their information delivery process to take advantage of a model-based approach to application development, and, in particular, how to implement systems from software components. Texas Instruments Software is able to advise on all aspects of information system delivery for organizations looking to achieve and to maintain that elusive competitive edge. Support ranges from white papers, to hands-on training and consultancy. Areas covered include business process reengineering, technical architectures, project planning and management, model management, development coordination and full software factory implementation.

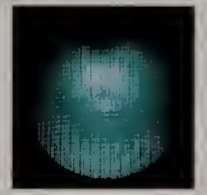
Microsoft leads the way in object interoperability standards



OLE is the industry's most widely supported object-based software integration architecture. With OLE, applications, systems and platforms from a broad range of vendors integrate seamlessly with each other and with custom and legacy software. OLE makes users and developers more productive by giving them choices of vendors, products and strategies.

Microsoft has designed OLE as a pragmatic and customer-oriented approach as part of an open design process. The result is a standard set of component interfaces, supported by Macintosh and UNIX, as well as Windows family operating systems, which allow components created in any vendor's environment to interoperate with any other. By providing OLE support, Microsoft and more than 300 other vendors will continue to ensure maximum interoperability between products, such as Visual Basic 4.0, office products, such as Excel, Word and Access, as well as those of other vendors.

Arranger is one such product, unique in its ability to link desktop applications to corporate systems, running in a wealth of server environments including UNIX and traditional mainframe environments, such as MVS.





TEXAS INSTRUMENTS SOFTWARE
OFFICES FOR THE AMERICAS

■ NORTH AMERICA - COMMERCIAL

Texas Instruments Software
P.O. Box 17263
Denver, CO 80217-9729
USA
Phone: 800-838-1843, ext: 4009
Fax: 303-294-0930
E-mail: tisb-us@ti.com

■ NORTH AMERICA - GOVERNMENT

Texas Instruments Software
2980 Fairview Park Drive
Suite 1100
Falls Church, VA 22042
USA
Phone: 800-394-1168
Fax: 303-294-0930
E-mail: nicw@msg.ti.com

■ LATIN AMERICA

DBA Engenharia de Sistemas
Av. Presidente Vargas, 3131 - sala 1405
Cidade Nova - Rio de Janeiro - RJ
Brazil
Phone: (011-55-21) 515-3222
Fax: (011-55-21) 515-3223
E-mail: dba@riosoft.softex.br

International Client/Server Technologies,
S.A. de C.V.
Miguel Laurent 160, 1st floor
Col. Del Valle
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The World Wide Web can be summed up in two words: chaotic organization.

Of course, one expects to find chaos in most emerging communities. The laundry lists within Web directories can be quite frustrating. And using search engines can be quite overwhelming when you retrieve over 2,000 sites with a single string of search words. Yet every now and then you catch a glimpse of organization within the disorder.

Good navigation and flow are key to any successful Web site. If we took snapshots of all the Web sites a year ago and compared them with their current setups, we would

see that many organizations have indeed reworked their sites with those objectives in mind. Why, the changes in *CIO*'s Web site (from a mere eight months ago) are astounding! One hard lesson we learned along the way is to keep the navigation simple—make it easy for people to locate what they are looking for.

And now you can subscribe to both *CIO* and *WebMaster* online. You can even register for one of our conferences right from your desktop. Our Web site provides an index of articles dating back to January 1993 along with more in-depth detail for many stories that have appeared in print. In terms of information resources, we're hard to beat: "IS Links" provides links to hundreds of information systems resources; "LinkMaster" can point you to thousands of useful sites in careers, business news sources, EDI information, training, marketing and entrepreneurial sources; "Browser" connects you to updates on Web products, services and other resources; and one of our most popular features, "The WebMaster's Notebook," contains Online Web Seminars, Technology Updates, Calendar of Events and Tools & Links for Webmasters. On the lighter side, we present "What We Learned on the Web Today" and humor columnist Ezra Poundcake.

So if you're tired of searching and searching, bookmark *CIO* Communications (<http://www.cio.com>) because we have everything a busy IS executive needs.

Wayne L. Levy

P.S. Every few years, *CIO* conducts a survey of our readers to ensure that we are successfully meeting your needs. Sometime in April or May, a randomly selected portion of our subscribers will receive our questionnaire. Your response is of the utmost value to us. We urge you to participate.

Coming In CIO

Managing Risk

Far from an exact science, risk management is an alchemy of common sense, careful analysis, foresight and just plain luck. With more profits and competitive advantages riding on projects today, information systems increasingly are the heart of many business strategies. The resulting pressures are forcing organizations to change the ways they study and manage computer-related risks.

Who's Guarding Your Nets?

Security experts agree that the unhappy worker, careless consultant or unattended temporary worker are as much—if not more—of a danger to corporate security as the willful, wily hacker. Good security begins and ends internally. A company's security policy should safeguard corporate data against malicious employees, contractors and consultants as well as protect it from the malevolent intruder. *CIO* will explore issues of tampering, hacking, deliberate destruction of data and mistaken corruption of data.

Doing It All

After a merger that left British retailer Do-It-All lacking the appropriate business processes to tackle the competition, its board of directors decided it had to improve customer service and the management processes within the company. That decision resulted in the Strategic Management System, designed to ensure that Do-It-All's business plan is actually driving management's decision making.



Board Chairman PATRICK J. MCGOVERN
President KELLY CONLIN
Chief Operating Officer JAMES CASELLA
Executive Vice President WILLIAM P. MURPHY

PHOTO BY WEBB CHAPPELL

Your Worst Nightmare

You're more vulnerable than you realize.

Transmitting sensitive data over local and wide area computer networks is a risky business. With unauthorized access to your company's confidential data, financial records or valuable trade secrets, a snooper is like a kid in a candy store. He can have it all....at your expense.

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TRENDLINES

OUTSOURCER EXAMS

TESTING, 1, 2, 3

With new Web initiatives underway and reengineering efforts afoot at Progressive Insurance Corp., the last thing CIO Allan Ditchfield wants to worry about is whether his outsourcing contractors will let him down. "When dealing with various new languages, new platforms and reengineering, we want to minimize the variables," he explains. "We have to make sure we have skilled tradesmen working for us."

To get hired by Ditchfield, would-be programming contractors must prove—quite literally—that they can make the grade by providing scores from TeckChek, a vendor-independent battery of IT competency tests developed by New York-based Bookman Consulting Inc. With some assurance that a contractor has the skills to do the job, Cleveland-based Progressive can reduce the chances that a subpar programmer will throw a project off track.

"Usually you don't know [a programmer is incompetent] until the end of the line, when it's most difficult to correct," says Ditchfield. "Most of the body shops are willing to replace the person. But if programming is part of the critical path of a project, you can't afford to have quality be a variable."

Now that many IT organizations are having to supplement their downsized staffs'

capabilities by outsourcing projects, more companies are likely to require proof of contractors' skills in the form of test scores or certification. While benchmarking skills internally is important, ensuring the competency of outsourcers can be even more critical, says Ellen Julian, senior analyst for the IT training market at International Data Corp. of Framingham, Mass. "Internally, you have your own criteria for employees: You went through the hiring process and know the history. When

you're outsourcing, you need to have guarantees," she explains. A recent study by IDC, which is owned by the same parent company as CIO, found that 32 percent of companies that don't rely on certification internally still would prefer to hire certified outsourcers (see chart).

Resumes alone don't tell the whole story, according to Phillip Schlup, an IS application specialist with Canton, Ohio-based Timken Co., which makes souped-up roller bearings. Timken once had technical staffers sit in on discussions with potential

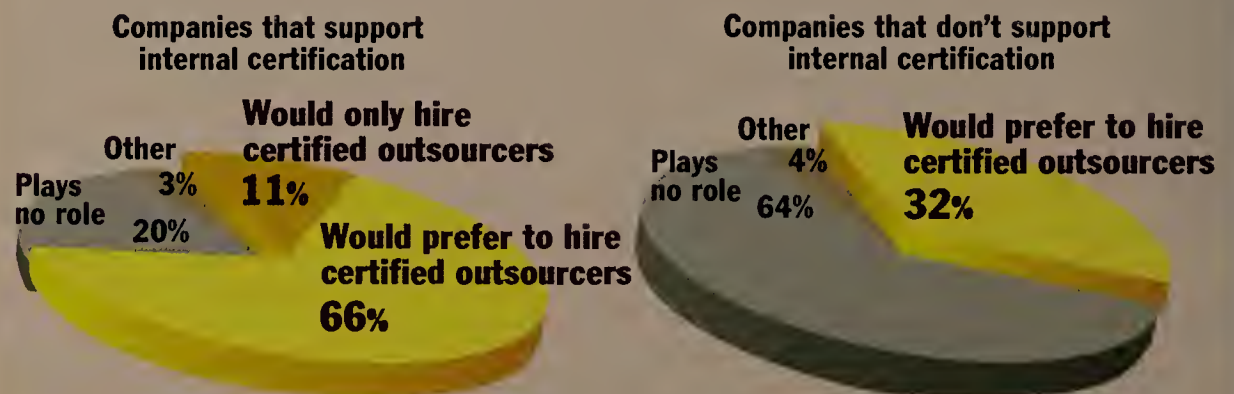
programming temps to determine whether they had the requisite skills to do the job. But technical staff didn't always have time to probe deeply enough to learn, for example, that a candidate had racked up most of his 10 years of Cobol experience in the 1980s and hadn't kept up with the language since then. As a result, between 10 and 15 percent of contractors hired by Timken didn't work out—and interviewing was eating up too much of technologists' valuable time. As the level of required expertise grew, the company couldn't risk hiring contractors who weren't up to speed.

In January, Schlup trimmed Timken's 67 suppliers of outsourcing contractors to a short list of nine first-tier suppliers and made providing appropriate TeckChek scores part of doing business with the company. After a month and a half, Schlup reports no problems with the 10 TeckCheked contractors he has hired. "TeckChek is bringing



Should Outsourcers Be Certified?

IDC asked companies that support certification of their own employees—and companies that don't—whether they prefer hiring certified outsourcers.



SOURCE: INTERNATIONAL DATA CORP. 1995



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TRENDLINES

us better resumes and better candidates, and we're receiving better results from contractors," he says.

Although some contractors bowed out when Timken demanded that they disclose their profit margins and supply TeckChek

scores, others eagerly embraced the opportunity to work more closely with Timken. Indeed, Tad Data Services, which had already been considering using TeckChek, accelerated its adoption of the testing service with the hope of gaining more business from Timken, according to Kathi McGill, director of data services for Tad in Cleveland. McGill says TeckChek is a valuable marketing tool that helps the company match clients' specific needs with workers' strengths.

By the same token, workers who become certified or score well on competency tests find it easier to market their skills. "Candidates are looking for ways to differentiate themselves in the marketplace," says Pam Cabalka, vice president of the technology business unit of Sylvan Prometric, a developer of certification exams in Bloomington, Minn. In fact, the number of people in the U.S. who took Sylvan's IT tests jumped 56 percent from 1994 to 1995.

Certification and high test scores may give CIOs more confidence in hiring contract workers, but they cannot always ensure success. Ron Fovargue, customer support manager at Frontier Information Technologies Inc. in Rochester, N.Y., says that is why he prefers hiring certi-

Percentage of the world population that has never heard a telephone dial tone: 50+

Percentage of the population served by 71 percent of the world's phone lines: 15

SOURCE: INTERNATIONAL TELECOMMUNICATIONS UNION'S WORLD TELECOMMUNICATIONS DEVELOPMENT REPORT '95

fied employees and contractors but doesn't consider certification a prerequisite. "I've had things go wrong with certified people," he says. "Certification doesn't guarantee a person will do it right; certifica-

tion gives me a knowledge benchmark. If I expected all certified people to be perfect, they'd never learn. You have to make mistakes."

—Alice Dragoon

THERE'S A REASON THEY BUY ONLINE...

"Online shoppers are mostly young, male nerds—**techno-weenies.**

The buying population on the Net is essentially

social **misfits.** People who are comfortable in public will **go to a store."**

—Seymour Merrin, president of Merrin Information Services Inc., a Palo Alto, Calif.-based research firm, as quoted in Investor's Business Daily, Jan. 8, 1996

VIRTUAL JOB HUNTING

Searching for a job is tough enough without having to worry about what sort of statement to make with your tie or whether your new pantyhose will sag into your shoes. In an ideal world, clothes—not to mention race and gender—would be truly irrelevant, leaving resumes to speak for themselves.

A virtual job fair hosted on the Web by Westech Expo Corp. and High Technology Careers magazine helps employers and would-be employees meet in cyberspace, where clothes don't count and sophisticated search capabilities heighten the chances of matching workers' skills with employers' needs.

A visit to <http://www.vjf.com> lets job hunters search more than 10,000 high-tech career opportunities and send their resumes directly to employers. Likewise, employers can sift through thousands of resumes using keyword and field searches.

According to Westech, the Virtual Job Fair site is the only address on the Web where job seekers can post resumes privately. Only human resources professionals from select high-tech employers can see them, and their view is limited to a candidate's skill sets, education and geographical location; the candidate's

name, address, telephone and fax numbers and e-mail address remain private. Employers respond to candidates who interest them through the Web site, which forwards to the candidate information on the job

opening and the company as well as specifics on whom to contact about applying for the job.

The site also features *High Technology Careers'* Career Resource Center, which is searchable by keyword, lists Westech Career Expo show information and provides links to employers' home pages as well as career, Web and computer resources worldwide. ■



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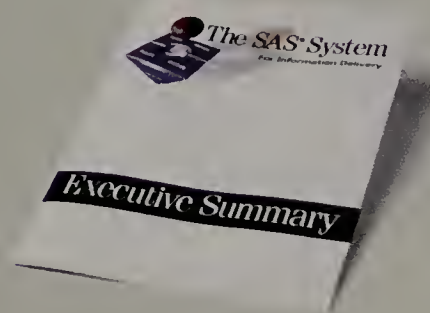


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TRENDLINES

TELEPORTS

WELL-CONNECTED IN TOKYO

In the land of the rising sun, technology is weaving its way into the fabric of everyday life. As the United States wrestles with defining and implementing a national information infrastructure, Japan is slowly transforming its cities, one by one, into international information and business hubs. This month marks the opening of the Tokyo Teleport Center, the hub of Tokyo Teleport Town (TTT), an integrated facility that provides fast, convenient access to advanced telecommunication by satellites, fiber optics, microwave and other networks.

Japan's fourth teleport, TTT is a new section of Tokyo, built on three artificial islands totalling 88 acres that



were reclaimed from Tokyo's harbor and linked to the mainland by a bridge, a transit system and a marine transportation center. Designed as an "ideal" city to ease congestion in Tokyo, TTT will balance aesthetics and practicality for its projected 63,000 residents and the 106,000 people expected to work there when construction is completed in 2010.

All TTT businesses and homes will be connected by

high-speed communications lines with a full range of broadband services, such as telephone, cable TV, automatic telemetering of utilities, interactive multimedia services, home banking, telecommuting applications and a community database with information on government, education and other public services. The network will be managed from Tokyo Teleport Center, a high-tech 237,000-square-foot building

providing on-site satellite ground stations and connections to local and national carriers. ISDN and mobile communications service will be provided by several carriers, including Nippon Telegraph and Telephone Corp. (NTT) and Astel Tokyo. In addition to affordably priced apartments, office complexes and an international exhibition center, TTT will feature a waterfront park, hotels and shopping.

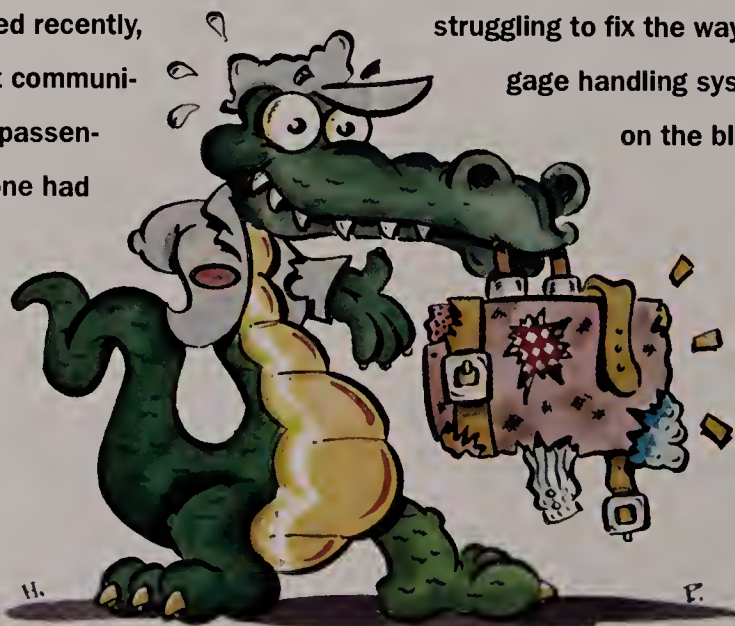
Robert Bell, general manager of the World Teleport Association, a private, non-profit trade association affiliated with the United Nations that helps develop teleports in Asia, Europe and the Americas, credits the success of the Japanese teleport program to the foresight of the Japanese government. In 1985, Japan passed a telecommunications law that ended the government monopoly of NTT, the government-owned national telecommunications carrier. At the same time, Japan began an initiative to jumpstart the country's information infrastructure by launching teleport projects in Tokyo, Osaka, Yokohama, Kobe, Nagoya, Sendai and Fukuoka. With the money from the sale of NTT, the government was able to provide interest-free financing for construction of the teleports, including the \$396 billion TTT. Thus the government's penny-wise practices have enabled the teleport projects to move forward even though Japan is in its worst post-war recession. Bell suggests that the United States could follow suit by earmarking some of the proceeds from its airwave auctions as funding for similar projects.

—Jennifer Bresnahan

AT LEAST THEY DON'T MAKE YOU LISTEN TO MUZAK

When the computer running the Denver International Airport's passenger subway system crashed recently, managers couldn't communicate with trapped passengers because no one had installed an intercom system in the cars. Next time there's a breakdown, the already-saddled-with-enough-bad-PR

airport will rely on six newly purchased bullhorns. Meanwhile, airport officials are still struggling to fix the wayward automatic baggage handling system. When it went on the blink in January, one passenger complained on a talk radio program that his bag "looked like it had been chewed on by an alligator," the Associated Press reported. ■



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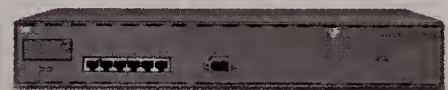
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TRENDLINES

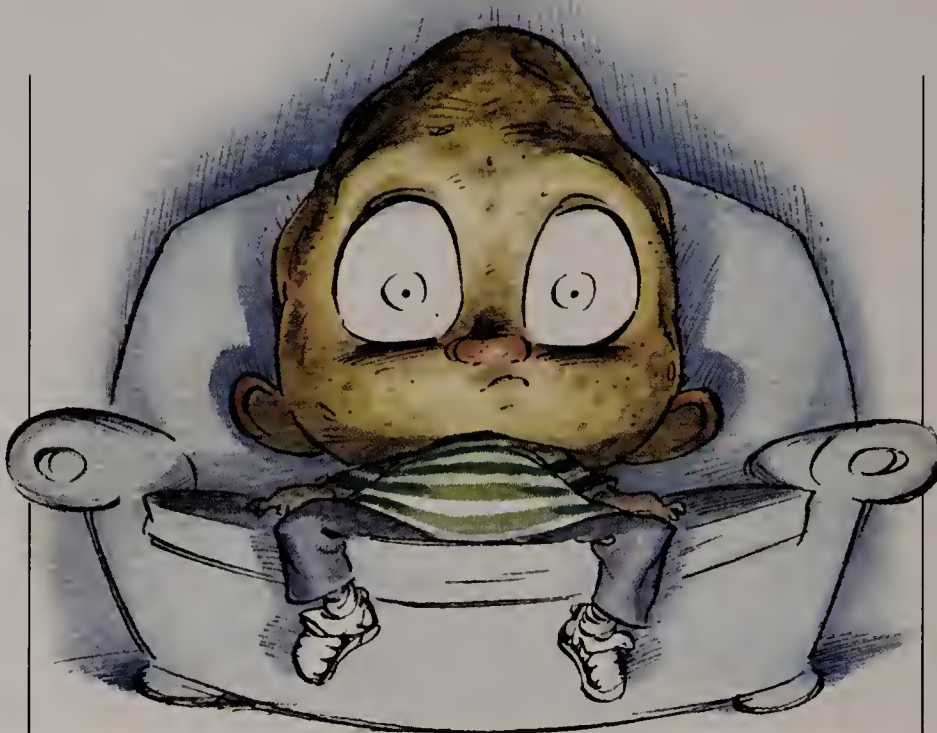
SO MANY CHANNELS, SO LITTLE TIME

An ad for a new product is likely to reach a soap opera fan glued to her television set long before it gets to a marketing analyst stuck at her desk. For those who need to keep up with what's on television but can't afford the time to track it, Televitesse Systems Inc.'s AccesTV may be just the ticket.

Integrating speech and voice recognition, video recognition and neural network technologies, AccesTV monitors the content of live television in real-time, scanning as many as 500 channels simultaneously to find key words chosen by the user. A query can be as simple as a list of companies or as sophisticated as descriptions of industries or potential events. When a keyword is found, AccesTV alerts the user, records the passage or does both, depending on the user's preferences. The entire spectrum of broadcast television is thus turned into a constantly expanding real-time database.

Besides being a boon for television junkies, AccesTV could help financial traders and analysts watch for events that may affect their portfolios, such as merger announcements or obscure natural disasters. Public relations and marketing specialists could also use AccesTV to track references to their clients, issues, products and campaigns.

AccesTV requires a multimedia Pentium PC running



I WANT MY HOME PC

Acouch potato is not a pretty sight, especially if your child is the little tater with eyes fixed on *Ricki Lake* or *The Simpsons*. But a recent survey from Find/SVP Inc. and Grunwald Associates suggests that parents can prevent their children from getting sucked into the TV habit by buying home PCs. Two-thirds of parents responding to The American Learning Household Survey report that their children watch less TV as a direct result of owning a family computer; in households with a multimedia PC equipped with a CD-ROM drive, that figure rises to nearly three-quarters. And kids aren't dropping TV just to play games; parents estimate that less than 40 percent of children's total PC time is used for game-playing and that kids spend the most time writing homework papers and exploring information. In 14 percent of family PC households, children now use online services—and those kids are more likely to be involved in sports, outside activities, volunteer activities and private lessons for such things as music and dance. The survey also revealed that young girls spend more time using home PCs than young boys do, though sometime between the fourth and seventh grades, girls' interest in PCs starts to wane. ■

Windows 95. A video capture board, closed-caption extractor and tuner are also needed in a server or stand-alone application; no additional hardware is necessary if the PC is run on a network that

supports IP multicasting. Unix, OS/2 and Macintosh versions of AccesTV are in the works. For more information, call 613 599-3648 or send an e-mail message to info@televitesse.com. ■

GAME OVER, DUDE

Cubicle-bound employees who log onto their computers and find solitaire, pinball and Heretic banished from their desktops may think themselves the victims of a particularly cruel April Fool's Day hoax. But for companies that worry about lost productivity and overloaded networks, UnGame software from DVD Software Inc. in Irvine, Calif., is no joke—it's a welcome tool for ridding the corporation of games.

Assuming 40 million users spend 30 minutes playing games each week at a cost of \$50 an hour, game-playing at work adds up to \$50 billion a year in lost productivity for American businesses, according to DVD's president, Dana Hollander. "We believe more damage is done from game-playing than from viruses," she says.

UnGame acts like a virus detection program, launching a search-and-destroy mission to eliminate games from network servers and hard drives. The program recognizes 4,600 kinds of games—and it's smart enough to recognize Doom when it sees it, even if someone has gone to the trouble of rechristening the file with a more businesslike moniker.

UnGame is available for Windows, OS/2 and DOS platforms at \$60 per file server—a cost the company claims is covered by just one saved hour of playing time. A shareware version can be downloaded from America Online, CompuServe or <ftp://coast.net/simtel>. For more information, contact DVD Software at 714 757-0615. ■

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Think Tank

BY TOM DAVENPORT

Knowledge Roles: The CKO and Beyond

KNOWLEDGE MANAGEMENT is all the rage. And it's not just a hot conference topic—it's actually being done.

Hewlett-Packard unveiled more than 20 initiatives to manage knowledge at a recent workshop. In the past couple of months, I've heard from headhunters about several job openings for chief knowledge officers. My usual barometer of whether a movement is real is the appearance of related help-wanted ads in the Sunday *New York Times*. Last Sunday: Bingo! Since such positions will proliferate, I thought it might be useful to describe the range of knowledge management roles.

Leave aside metaphysical questions about what constitutes knowledge and how it differs from information. If information, as Peter Drucker once noted, is "data endowed with relevance and purpose," let's view knowledge as high-test information.

Distinctions worth making, however, are the differences among knowledge management, organizational learning and intellectual capital. The distinctions are evident in the types of people hired for the se-

nior knowledge role and in their titles. Chances are, a "chief knowledge officer" captures and leverages structured knowledge, with information technology as a key enabler. But if the moniker is "chief learning officer" (a position recently established at General Electric and Coca-Cola, for example), bet that the job is about training and education and involves HR function more than IS. Positions having "intellectual capital" in the title tend to be hybrids, with a focus on converting knowledge into revenues and profits.

At Coca-Cola, Judith Rosenblum, the new CLO, was previously vice chair for "learning, education and human resources" at Coopers & Lybrand. Her job at Coca-Cola, according to the appointment memo, involves "creating and supporting an environment in which learning—and applying what we learn—is a daily priority for all of us." It sounds as if the role will include a strong dose of cultural change along with the usual training and HR bureaucracy. Nothing wrong with that, of course, but I wonder if it's enough to make a difference in the day-to-day management of know-how.

CKO jobs, on the other hand, often involve overseeing efforts to use technology for knowledge capture and distribution. A good CKO should combine an orientation to structured, explicit knowledge with an intuitive feel for precisely how cultural and behavioral factors may impede or enable the leveraging of knowledge in an enterprise. Measurement and economic return should also be key points of focus. Executive searchers tell me that it's difficult to find this combination of hard and soft in one person.

CKOs have three critical responsibilities: creating a knowledge management infrastructure, building a knowledge culture and making it all pay off. Constructing a knowledge management infrastructure involves more than deciding between Notes and the Web. There is a technology component, of course; the task involves workstations, networks, databases, search engines, and even word processing and desktop publishing tools. But the human infrastructure issues—creating mechanisms for the development and maintenance of knowledge bases in different functions and departments—are more difficult to manage.



PHOTOS BY WYATT McSPADDEN

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News, Trends, and Ideas for IT and Business Managers

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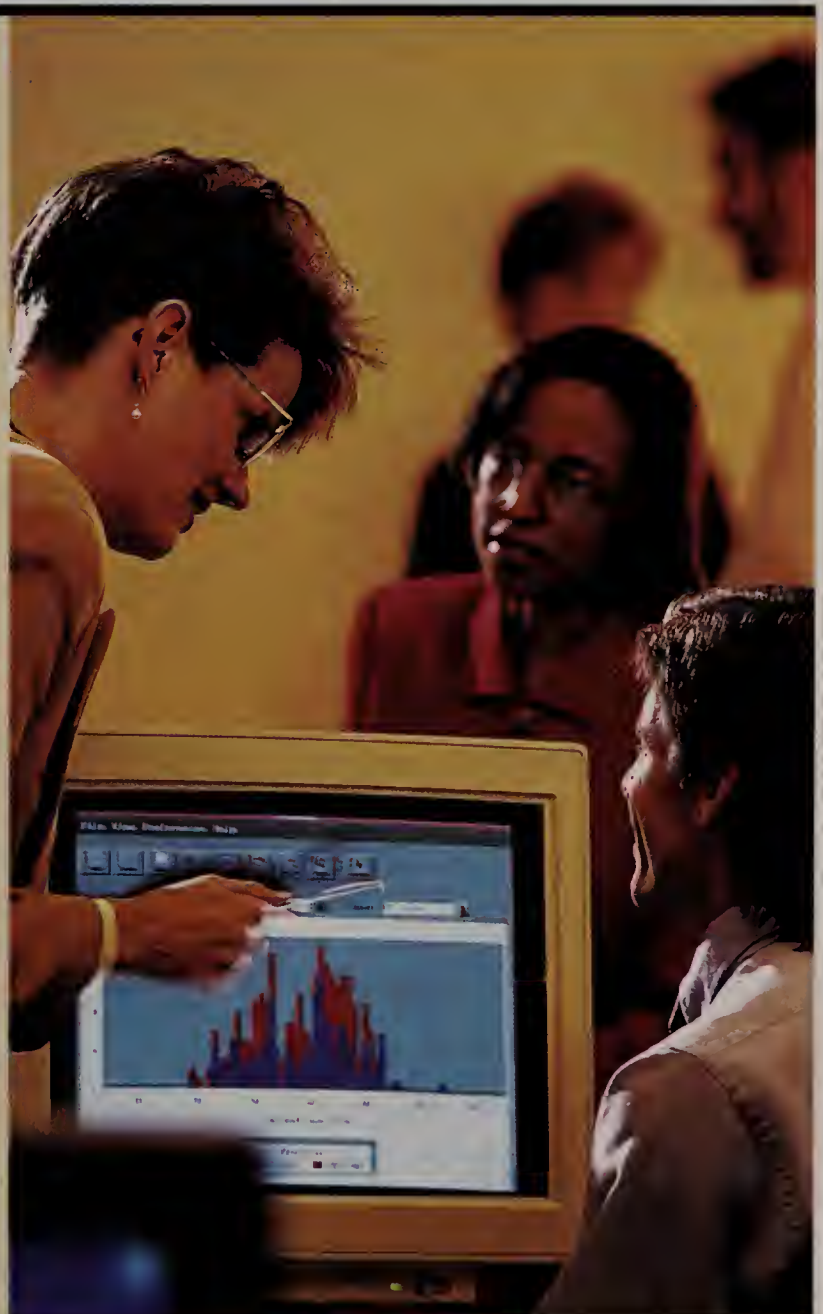
The SAS® Data Warehouse: Building Success with a Built-in Architecture

As the global marketplace grows more crowded and more competitive, the pressure is on for business analysts to arrive at the most informed, effective decisions. Unfortunately, these decisions are often fed by a steady diet of one-shot software packages...particularly on the desktop.

In response, IT managers everywhere—faced with the impossible task of supporting so many software tools from so many different vendors—are reevaluating the entire process of enterprise information delivery. What they're discovering is that technology for technology's sake does not facilitate better decision making.

The real challenge is identifying, implementing, and integrating just the right mix of technologies to meet both IT and business goals.

The SAS Data Warehouse helps you meet this challenge by bringing these core technologies together in a single, powerful, and integrated software environment.



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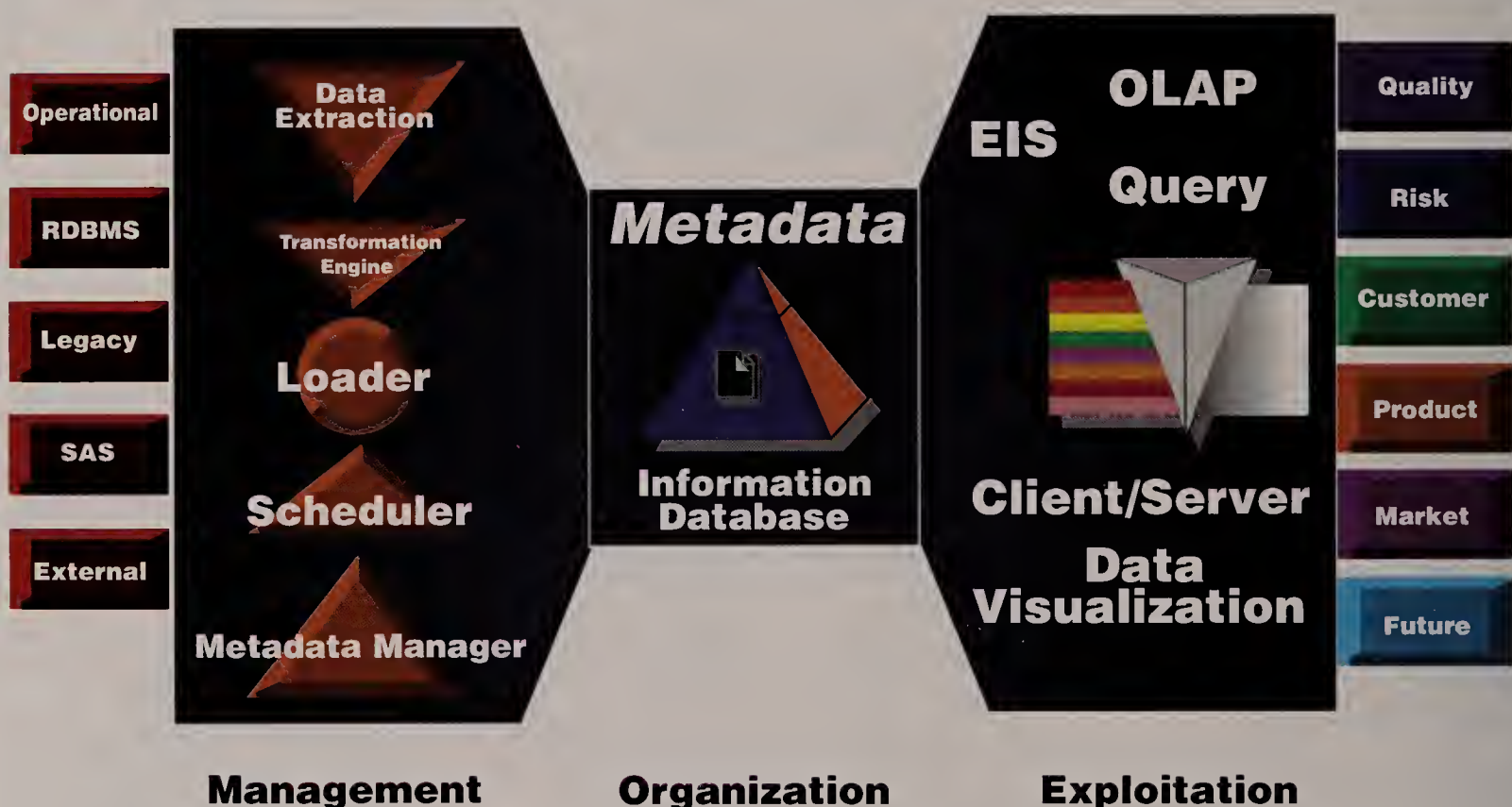
Within the SAS Data Warehouse, everything is fully integrated. The tools used to build the warehouse are the same ones used to maintain it...run it...and change it. What's more, everything's scalable. You can jump right into enterprise-wide information delivery applications, or start small and then build on your success.

This single-source approach encompasses everything from back-end access to legacy systems to front-end decision support and business intelligence capabilities. In addition, you can develop applications quickly in response to changing business needs.

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Once accessed, the SAS Data Warehouse begins **transforming data into a consistent, integrated form**. This process involves cleaning, reconciling, de-normalizing, and summarizing data and then loading the data into logical data views that can be surfaced into a variety of analytical and reporting applications.

A Faster Way to Adapt to Change...and to Deliver Targeted Business Solutions

The SAS Data Warehouse, by design, lets IT managers respond immediately to the evolving way business users need to extract data. Changes in your business model are quick to execute. Unlike relational databases, you don't have to rebuild the model from scratch.

Using an iterative approach to applications design and deployment, you can build a pilot application quickly. Then test the application, incorporate any feedback, and build on your success in every application that follows.

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The SAS Data Warehouse supports your client/server computing strategy. An exclusive MultiVendor Architecture™ means data and applications are portable across your entire hardware spectrum—from desktop PCs and workstations to midrange computers and mainframes.

In addition, the SAS Data Warehouse fully supports Open Database Connectivity (ODBC). Your data warehouse is always open to external applications, whatever they are and wherever they're located—including news wires, stock market data, and demographic or geographic data.

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The SAS Data Warehouse provides a metadata structure that can dramatically decrease your administrative load. A built-in metabase defines where data comes from, how it is stored, what it represents, and how it can be used.

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Working in conjunction with IT and business managers, we've developed a series of Checklists for Data Warehousing Success, which provide a fail-safe guide to the hows and whys of data warehousing. You'll find these Checklists under What's New on the SAS Institute WWW home page, or give us a call.



Merrill Lynch Grows a Grass Roots Data Warehouse

Merrill Lynch is one of the premier diversified global financial services companies, and heads the list of securities firms in the U.S., with assets of \$643 billion.

When, in 1992, the systems area of Merrill Lynch's Quality Assurance Group began a project designed to provide even better service, they had no idea that what they were building was—in fact—a data warehouse, one of the hottest processes of the decade.

Nor did they realize that the new infrastructure—built using SAS software on the desktop—would lead to a three-fold increase in programmer/analyst productivity. This has allowed the Group to provide users with an increasing array of business-critical services without adding head count.

But the biggest surprise was that what began as a grass roots effort would evolve into a valuable source of information for the enterprise.

"The most important information now being supplied by the data warehouse is which services have a direct impact on customer satisfaction," says John Crawford, Manager of the Systems Area of the Quality Assurance Group. "We track service requests from our clients—everything from ordering a new book of checks to making massive money transfers—and provide the back-office people with summary and detail data for analysis. In addition, we collect invaluable information from Merrill Lynch's quarterly client satisfaction survey. Armed with this information, analysts can determine which service requests have the biggest impact on satisfaction and how the firm can better meet its clients' needs."

He adds that "it's the robustness of SAS software in the client/server environment that makes it possible for us to offer increasing information-based services to a growing number of users...this kind of effort can be expanded to include enterprise-wide management systems that can be used to analyze customer interactions, plan marketing initiatives, analyze risk, provide decision support to top management, and—in general—make Merrill Lynch even more competitive."

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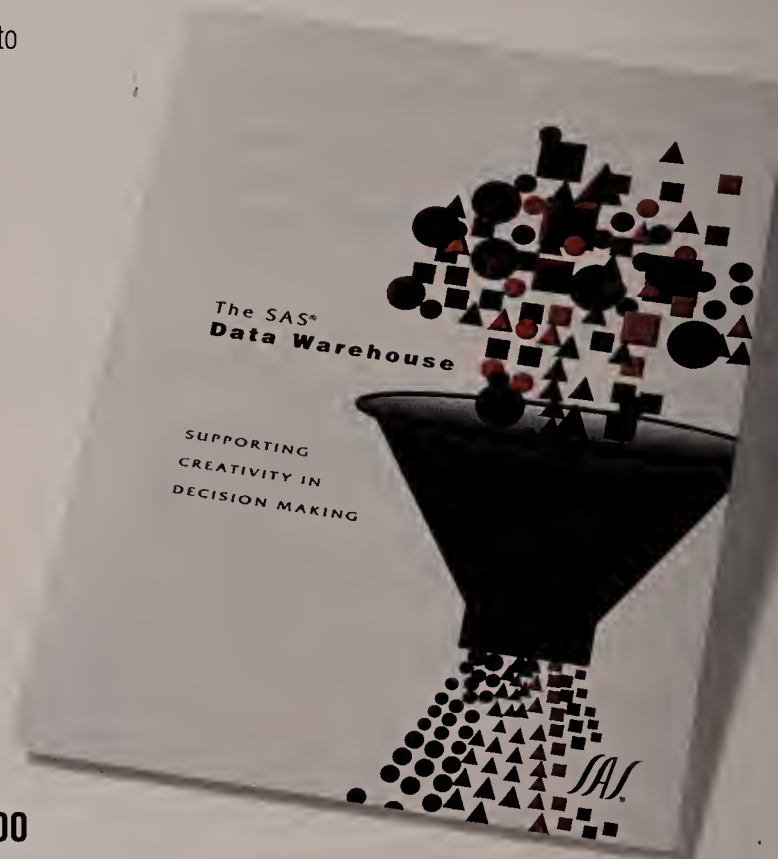
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Not surprising, culture-oriented CIOs make good CKOs. Nicholas Rudd, a regular on the organizational learning conference circuit, surrendered his CIO job at Young & Rubicam, the big advertising agency, for a new CKO role at Wunderman Cato Johnson, a Y&R business unit. Rudd had yearned to move in a knowledge-oriented direction for several years but felt he could have more impact at the business unit level.

Finally, this train's not going anywhere without being fueled by dollars, yen and marks. The CKO has to determine how better management of knowledge will help a company make or save money—and document that economic impact. Gordon Petrash, global director in intellectual asset management at Dow Chemical, for example, saved his company more than \$40 million in tax maintenance obligations through better management of patents alone.

Building an Infrastructure

John Peetz, partner and CKO at Ernst & Young, has set up a three-part organizational infrastructure for knowledge management, with “knowledge councils” for international, U.S. and individual business unit (audit, tax, consulting) operations. Within the consulting unit, which got started on knowledge management first, there are “knowledge networks” for each key practice area. The creation and maintenance of such an infrastructure takes time and effort, but that labor is necessary if knowledge management is to become institutionalized.

Just as few CIOs bang out code, the CKO generally does not build knowledge Web sites or Notes discussion databases. But in addition to the knowledge executive, at least two other positions are needed: the knowledge initiative manager and the knowledge editor/reporter.

The knowledge initiative manager is analogous to the leader of a reengineering project or a strategic planning group. In fact, knowledge management initiatives are similar to those more familiar types of projects insofar as they are process oriented

and advance some strategic goal.

Knowledge initiative managers should have facility with project, change and technology management. Good candidates may have led successful research, reengineering or behavior-changing IT projects in the past. They should also have a strong sense of their own limitations. A manager at a pharmaceutical firm told me of the lure of the “dark side” of knowledge management. When those who lead such initiatives learn a great deal about the knowledge domain being managed, they may come to feel that they know more about

**We need people who
are able to extract
knowledge from those
who have it, reorder it
to a form anyone can
use, and update and
edit it as required.**

the field than anyone in the company. The resulting arrogance is detrimental to the initiative's success.

Knowledge Foot Soldiers

The day-to-day knowledge management technical tasks must also be done: writing HTML and Perl scripts for Web sites and figuring out what “Web enabled” really means in Notes Release 4. Even the technologists should have a strong focus on how knowledge content can be made appealing and how those who have knowledge can be persuaded to put it into a knowledge base.

The most intriguing new knowledge jobs, however, can best be described as knowledge reporter/editors. Even if employees have the skills to frame and structure knowledge, few have the time to put what they know into a system. We need people able to extract knowledge from those who have it, reorder it to

a form anyone can use, and periodically update and edit that knowledge. These skills are not really taught anywhere, but the closest approximation may be found in journalism schools. Anyone who can pull a breaking event off the police radio, speed to the scene of the crime, get some cops to spill the beans and put it all into a story before deadline can probably write a good item on a new patent for submission to Notes.

An alternative source to journalists is the group that was christened “knowledge engineers” in the heyday of expert systems. Surely some of them could gather and process knowledge, though most of the ones I know care more about well-structured Lisp code than chasing down a good story. Even their title sounds a bit arrogant; somehow I prefer the heritage of Jimmy Olsen and Lois Lane.

Editor/reporter jobs are proliferating rapidly. Andersen Consulting has more than 100 of them; Ernst & Young and McKinsey & Co. probably have close to that. HP has 20 or 30. One challenge before these knowledge reporter/editors is to develop an occupational community.

These roles all require a combination of “hard” elements (structured knowledge, technology and tangible benefits) with “softer” traits (a sure sense of the cultural, political and personal aspects of knowledge). Obviously, it's not easy to find all this in one person; being well-rounded isn't within everyone's reach. But it is particularly important that senior knowledge executives are able to grasp the whole concept. At a minimum, knowledge management teams should combine these hard and soft orientations, and each member must respect all required skill sets.

I suppose what I'm describing is the yin (or perhaps yen) and yang of knowledge management. I can't wait to see *that* in a want ad. **CIO**

Thomas H. Davenport is a professor and director of the Information Management Program at the University of Texas in Austin. He welcomes reader comments: Tdav@notes.bus.utexas.edu.

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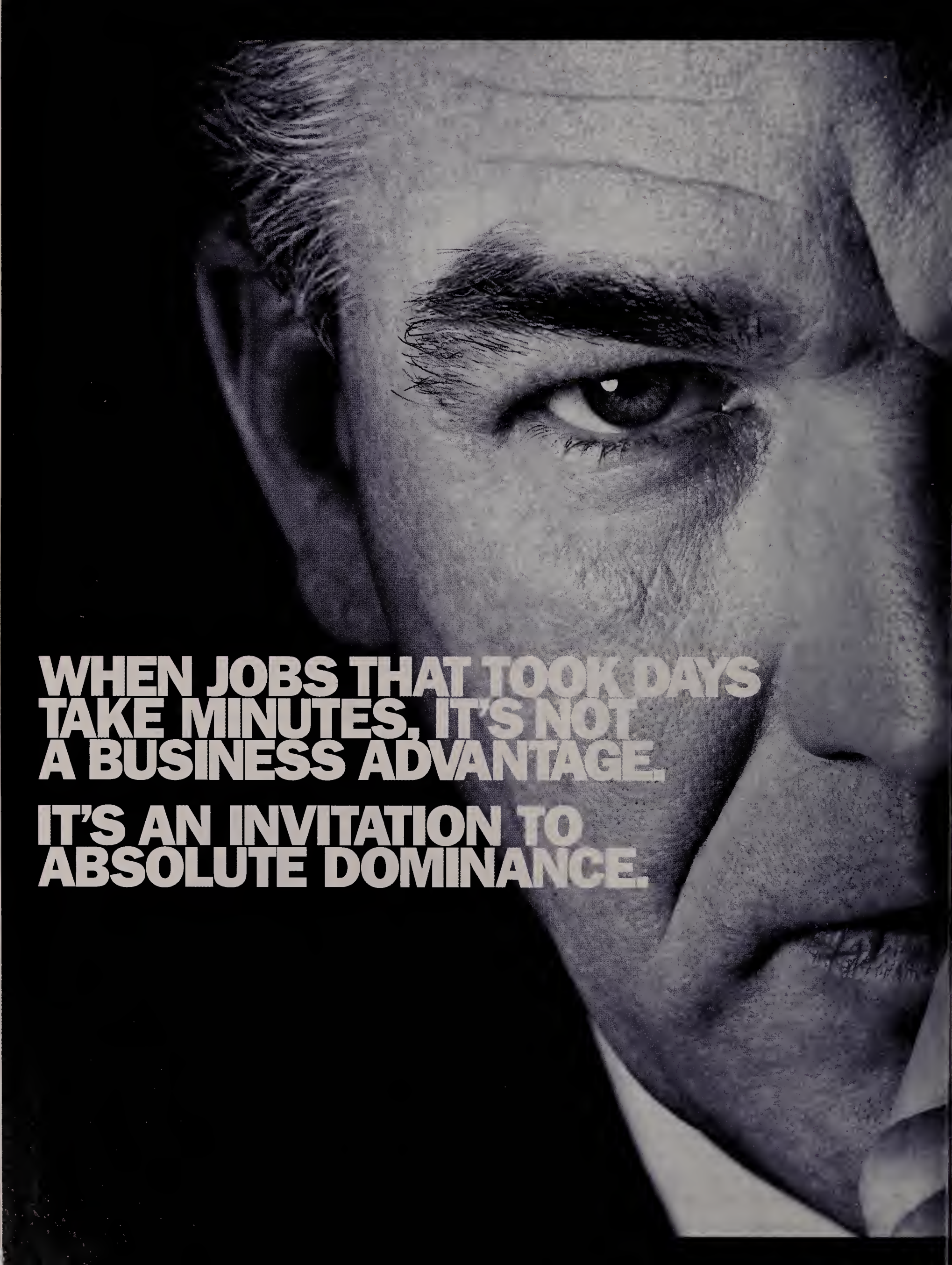


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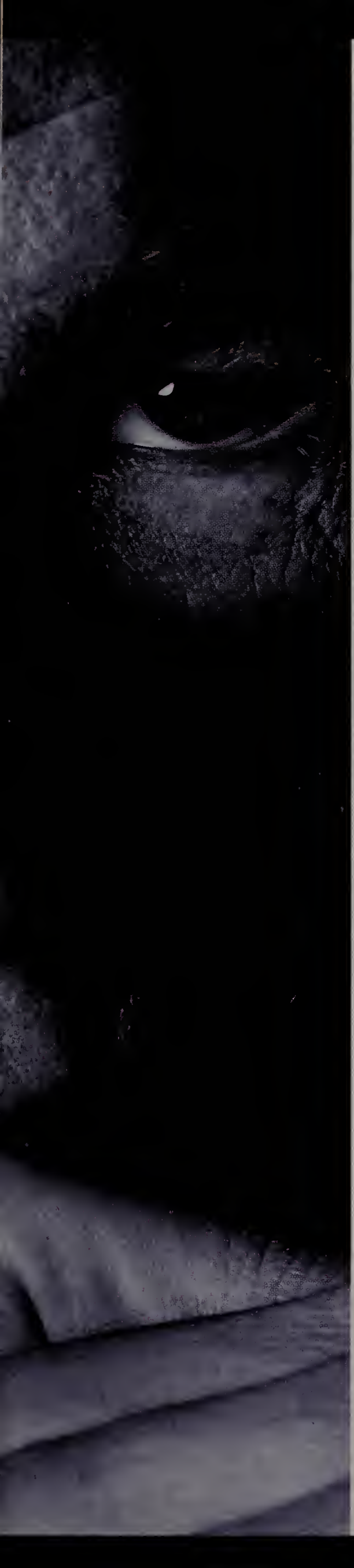
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Buy Global, Skip Local

STORYLINE

Global sourcing—the contractual purchase of products and services on a worldwide basis—can save multinational businesses time, money and headaches. But while vendors are more willing and able to cooperate by offering fixed or discounted global pricing, obtaining it is still a tricky task that takes tough negotiation, an arsenal of arcane product knowledge and compromise between central authority and local autonomy.



BY MARSHA W. JOHNSTON

“IT’S A LOT OF WORK, but it’s good for you, and we’re saving between 30 and 40 percent on the initial purchase cost of our PCs, servers and software,” says Mark Dickens of Federal Express Corp.

Charged in late 1994 to conduct a definitive global sourcing survey for all future PC, server and software purchases at FedEx, and fed up with passive procurement, Dickens went on the offensive. For a strategic supplier relationship worth at least 30,000 PCs per year and tens of millions of dollars, his group sent out not a few but 47 detailed requests for proposals around the world. Dickens, the managing director for global automated products for the Memphis, Tenn.-based shipper’s Information and Telecommunications Division, was then shocked to see the RFPs largely ignored while the proposals he did receive were unacceptable. “Even we knew that the prices they were asking were high,” he says. “It’s no longer enough to fill out an RFP and wait for the offers to come back.”

So Mohammed went to the mountain.

“We went around the world to visit vendors in Japan, Korea, Taiwan; we met with every major PC supplier in North America, some more than once,” Dickens says. “Before we were finished we had seen 70 percent of the world’s surface mount technology,” Dickens says.

Not surprisingly, when the investigation was completed, FedEx knew more about the PC business than the individual vendors did. “We would hear them say that their competitor didn’t have X product, and I’d be thinking, ‘Well, I saw it on their assembly line.’ It put us in a powerful negotiating position,” Dickens says.

In these days of bare-bones corporate operations, the fact that FedEx sent Dickens’ group around the world underscores how seriously users, and vendors, view global sourcing—contracting to obtain favorable worldwide terms on products and services. From Minneapolis to Munich, CIOs of multinational corporations are grappling with how to buy information technology products in ways that simplify or centralize the process and reduce or standardize the costs.





MARK DICKENS: *"We went around the world to visit vendors in Japan, Korea, Taiwan; we met with every major PC supplier in North America, some more than once."*

Historically and even today, in the age of the Global Enterprise, global sourcing has been an elusive goal. IT vendors with international presences often operate in decentralized fashion, with the local supplier responsible for its own profit and loss. Vendors that lack the size to spread staff around the world must subcontract with local distributors or value added resellers (VARs), who are even less willing to forgo local account control. Consequently, vendors have been less inclined to negotiate worldwide sourcing contracts with multinational customers.

"Whether it be IBM or Oracle, they have trouble defining things on a global basis," says Claude Marais, director of processing services and planning in information services at Philadelphia-based Elf Atochem North America Inc., the U.S. subsidiary of French oil, natural

gas and chemicals giant Elf Aquitaine. "I would expect them to look at what their margin for me would be on a global basis, but they always want to look at me country by country." Marais founded the Society for Information Management's IT procurement working groups, which hold a yearly meeting focused exclusively on international issues. (Contact Marais at clarais@aol.com for information.)

While easy global contracting may still be the exception, in just the last two years the industry's top vendors have customized their organizations and procedures to better accommodate customer demand for a simplified, economical global purchase.

Oracle Corp. has been trying to globalize its operations during the past two years, says Mike Hagan, director of global business practices. "We've grown up with sub-



“I DON’T WANT TO CARRY A 50 TO 100 PERCENT PREMIUM FOR VENDOR INEFFICIENCIES IN DIFFERENT COUNTRIES.”

—CLAUDE MARAIS

sidiaries having a lot of autonomy, with their own policies. After a time, we start to look like a lot of separate companies selling similar products. We now have a three-tier standardized pricing structure worldwide instead of the 27 different price lists we had when I got here.”

Digital Equipment Corp. replaced a regional warranty structure with a global one and simplified its service menu to facilitate more transparent pricing, says Hermann Binder, Digital’s planning and operations manager of multivendor customer service in Geneva.

In mid-1995, IBM Corp. set up a central “global customer offerings” group designed “to review the merits of an opportunity on a global basis without trying to favor one country over the other,” says John Stikeman, the group’s manager of development. “The number of global bids we’re doing is increasing exponentially, whether they are for PCs or services.” IBM also has global warranties, and IBM and Digital provide consolidated invoices to simplify paperwork.

Controlling prices paid for IT products is undoubtedly the prime motivation for cultivating a

ception for his company; price differentials for PCs in particular are seldom large enough to make the U.S. exporting scheme worthwhile.

The bottom line isn’t the only reason to seek global sourcing. The need for worldwide price consistency can originate with as simple a goal as maintaining corporate harmony. Katherine Lucas, supplier relations manager for Elf Aquitaine in Paris, says she must have a more or less uniform price “because people in our group talk to each other, and they will no longer accept differences of up to 33 percent.”

Marais, who frequently shares the lead negotiator role with Lucas, adds, “I’ll say to the vendor, ‘I would pay you \$2,000 per seat for this software, and yet my counterpart would have to pay \$5,000 per seat. He’ll look stupid within the organization.’”

Vendors maintain that country-to-country price differentials are the product of widely varying cost bases. “We have huge differences in operating costs, mainly the cost of labor, whether it’s billable or expense items,” says Stikeman.

Binder concurs. “There can be up to a 50 percent difference between salaries in Germany and Portugal, for example. If the customer insists on a single price, Digital would

“IF THE CUSTOMER INSISTS ON A SINGLE PRICE, DIGITAL WOULD GIVE AN AVERAGE BASED ON WHERE THE PRODUCTS ARE TO BE DISTRIBUTED.”

—HERMANN BINDER

global sourcing contract. Invariably, the goal is to limit price differentials among countries caused by varying labor costs, tariffs, currency fluctuations and taxes.

The discrepancy in pricing can be startling. Last year, Nestlé S.A. of Vevey, Switzerland, found midrange computers in Japan with a 90 percent premium over midrange prices in the U.S. “The manufacturer admitted that it was excessive, saying that there were historic reasons, including the foundering of the dollar vis-à-vis the yen and the cost of distribution in Japan,” says Nestlé Senior Vice President Jean Claude Dispaux. “We threatened the vendor with buying in the U.S. and exporting to Japan. It was a discussion that lasted several months” before Nestlé got satisfaction, he says. Dispaux acknowledges that these days, the Japanese incident is more of an ex-



give an average based on where the products are to be distributed,” he says. Binder explains, however, that prices are not transparent and must be constantly adjusted to account for changes in the contract’s geographic coverage.

Marais says he doesn’t buy the vendors’ excuses and is positively merciless on the point. “I understand that taxes and tariffs are different, but I negotiate on a pretax level,” he says. “They may tell me their operations cost more in country A or country B, but I don’t want to carry a 50 to 100 percent premium for their inefficiencies in different countries.”

Furthermore, “there is nothing to substantiate that

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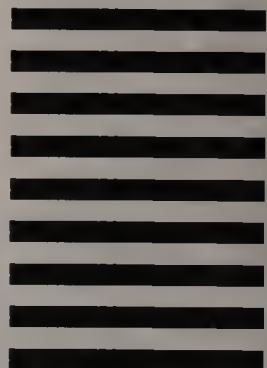
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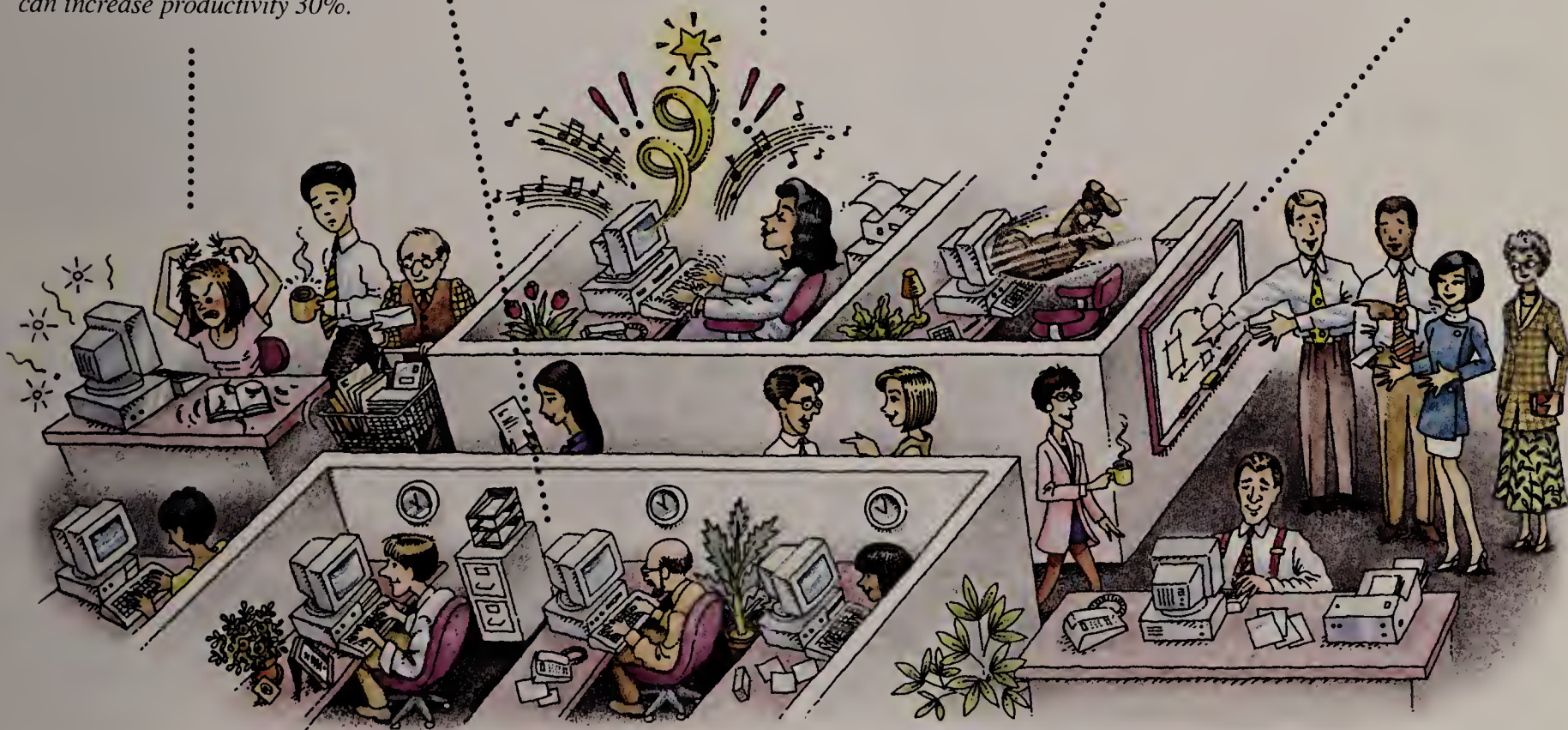
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salary differences are 30 percent different" between countries, says Marais, citing a 1995 Gartner Group study (study TV140-249 by A. Dailey). The study, by Gartner's Software Asset Management division, concludes, "We have not seen any quantified analysis of business costs across European countries. We believe that the costs of doing business there are not as high as

price differentials. Cargill's PC vendor provides a discount to resellers who purchase and resell the equipment to Cargill. Consequently, the food supplier knows

"OUR DIVISIONS ARE VERY AUTONOMOUS, ENTREPRENEURS. IT'S REALLY THEIR PROBLEM TO GET THE SUPPORT AND MATERIALS THEY NEED."

—BRUNO ZUCCARO

vendors claim they are. We believe that the incremental cost is less than 10 percent over the U.S. list price."

"It all comes back to the amount of information you have for dealing on a global basis," Marais concludes. "They might say, 'There's a 30 percent cost-of-living adjustment,' and I say, 'No, our research says it's only between 4 and 8 percent.' Then they might say, 'It costs us X to export it,' and we say, 'No, you are manufacturing in the U.K.; it shouldn't cost that.'"

London-based food commodity producer Cargill PLC leverages similar knowledge to mitigate regional PC



the price the reseller has paid for the PCs, "and we negotiate the margin—5, 10 or 15 percent—based on what service the reseller is providing," says Steve Morton, Cargill's IT infrastructure manager for Europe and Asia/Pacific.

However they determine the price, most users seem to agree that global contracting is far easier for computer and software products than it is for telecommunications or IT services.

Obviously, state-owned monopolies and legislative constraints in certain countries prevent telecommunications companies from offering global pricing. Today, only private or closed user-group networks or intracompany networks can be globally priced, says Bill Marmon, an executive director at MCI Communications Corp. "With respect to closed user-group networks, the choice has liberalized quite a lot [from the era of monopolies], but everybody is looking forward with great expectation to 1998 for even more deregulation in Europe," he notes.

It is also very tricky to negotiate a global deal with network equipment vendors because of their reliance on VARs, which have their own pricing structures, says Morton. Most of these companies, such as network products manufacturer Cisco Systems Inc., are growing rapidly worldwide and haven't had the time to set up worldwide networks, he says. "And many don't even plan to because it would impact the cost of their product."

Unable to get around Cisco's VARs to negotiate a global contract, Morton concluded a master purchasing agreement with Cisco for North America. That agreement included authorization to buy in the States and ship to Cargill sites worldwide. "We have gone to the VARs outside the U.S., told them of the agreement and said, 'We need a relationship with you for maintenance.' In 70 percent of the cases, we achieve more realistic pricing," he says.

An intermediary problem similar to that of the VARs can confound global service warranties as well. In the approximately 80 countries where Digital works through a

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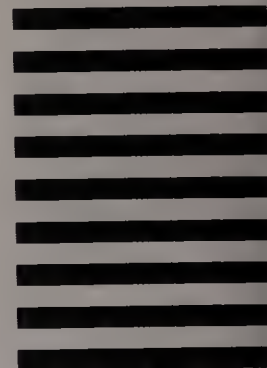
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distributor, for example, manufacturer warranties are not honored because local distributors have their own versions. "We're trying to find a model that satisfies both sides from a compensatory and administrative point of view, but the distributors are independent and not always keen to take on the management of our warranties," Binder says. He adds that those countries account for only about 10 percent of Digital's business volume.

Another means to achieve global cost control is through reduction of the internal administrative burden. But that goal does not translate into a single preferred administrative structure. Some companies favor tight, centralized supervision of purchasing, while others believe local purchasing authority is the best way to ensure good vendor relations, attentive service and even lower prices.

At FedEx, centralization is the new rule. Dickens' search for the appropriate global vendor partners was complemented by a recentralization of internal IT pur-

sions are very autonomous, entrepreneurs. It's really their problem to get the support and materials they need," Zuccaro says. "Centrally, we manage the infrastructure, but certain things should be done locally."

At the decentralization extreme is Minneapolis-based hotel chain Radisson Hotels Worldwide. For reasons of good local business relations, David Sjölander, director of hotel systems, prefers all 380 hotels in 39 countries buy their computers locally. "A lot of times you alienate the local dealer by buying in the U.S., exporting it and then asking him to do maintenance on it. We would rather give them the business and have better relations with them," he says.

"Besides," Sjölander adds, "sometimes the local pricing is lower than you could get by exporting from the U.S. or another part of Europe. Recently, we opened a hotel in Riga, Latvia, and found an authorized Compaq distributor with wonderful prices and service. In Latvia!"

Nestlé's Dispaux agrees that alienating service providers can be a consequence of global sourcing. "We did a global software contract and then realized that the local subsidiary was not at all motivated to give us good ser-

"I DO NOT ACCEPT THAT I'LL GET SECOND-QUALITY SERVICE BECAUSE I NEGOTIATED A GLOBAL ACCORD."

-JEAN CLAUDE DISPAUX

vice," he says. Dispaux forced the supplier to work it out internally, saying, "I do not accept that I'll get second-quality service because I negotiated a global accord."

But Dispaux is willing to make global sourcing exceptions to leverage local relations. "We keep relationships with the big service suppliers but not to the extent of setting prices. That would take away the local operation's ability to determine what they need." For example, Nestlé has 1,400 IBM PCs in Vevey but 20 Hewlett-Packard Co. PCs in a small unit on the other side of Switzerland. "I may pay a little more for the machines [compared with the IBM units], but HP is across the street from their office, and if something goes wrong, it takes only five minutes to get it fixed. In this case, it would be very difficult to impose a global purchase policy."

For all the financial, political, cultural and legal hurdles to clear in achieving a global purchasing arrangement, CIOs who have survived say it is worth it. "Doing proper global acquisitions with a vendor can save between 15 and 30 percent, depending on the countries involved," Marais says.

CIOs who have yet to pursue global sourcing should act quickly, says Oracle's Hagan. "I think that a while back, globalizing purchasing was a choice you could make. But today, deciding not to would be like deciding not to play at all." **CIO**

Marsha W. Johnston is a freelance writer based in Paris. She can be reached at 5349821@mcimail.com.



chasing authority. Now, instead of calling a favorite dealer or distributor and having the order charged to a cost center, every FedEx employee must place an order for one of several approved product groups through a Memphis-based purchasing organization.

"It was a major cultural change," says Dickens. "But it's important as companies become more networked. The systems need to work together."

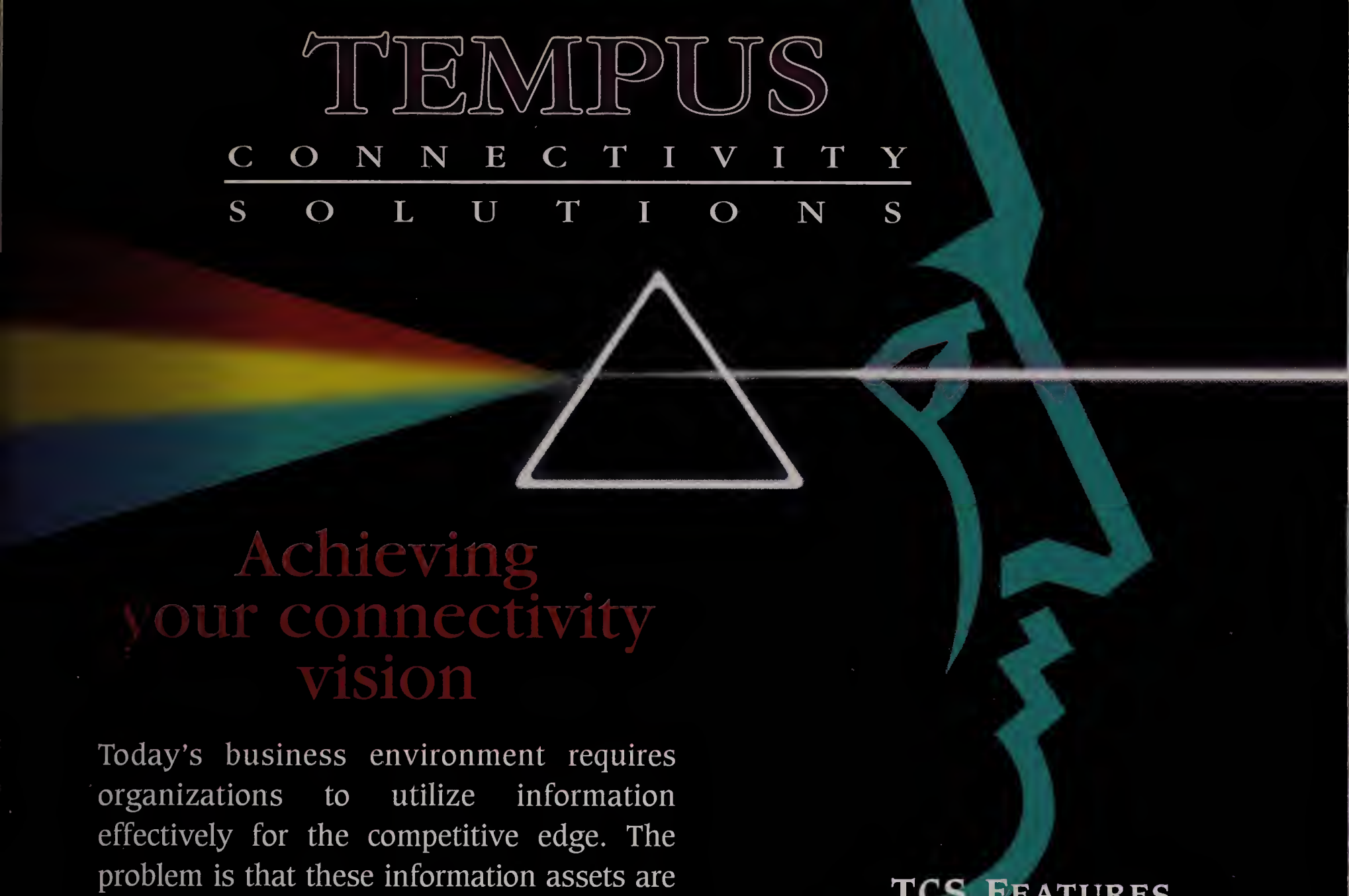
Elf Aquitaine and Elf Atochem use what Marais calls a "virtual" central purchasing organization rather than a single central site. "If it makes more sense to acquire in Philadelphia, I do it. If it makes more sense in Australia, I do it there. If, for example, the vendor pads prices in Europe, I will negotiate in the United States," he says. A virtual process is also useful for more than price, he notes. For example, the company could write its maintenance contracts in countries that favor users with greater rights than do other nations.

In the dead center of the centralized/decentralized range of companies, apparel firm Benetton Group SpA in Ponzano, Italy, relies on a hybrid purchasing plan. Bruno Zuccaro, director of information systems, handles negotiations centrally for contracts over 100 million lire (\$60,000 U.S.). But for the rest of the deals, "our divi-

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In the sun-baked Sonoran Desert on the outskirts of Phoenix, Motorola is orchestrating the launch of a worldwide wireless satellite communications network. The Iridium project includes what may be the largest commercial software effort ever undertaken. Here's how it's being managed.

BY PETER FABRIS

A FULL-SCALE, 13-FOOT-LONG Satcom communications satellite model hangs in the glass-enclosed lobby of Motorola Inc.'s Satellite Communications Division headquarters in Chandler, Ariz., about a half-hour drive from downtown Phoenix. The future is there, right above your head; but every time the building's automatic doors slide open, the unmistakable aroma of the cattle ranch across the road drifts through the foyer. This juxtaposition of an Old World agrarian odor with a shiny new exemplar of a futuristic wireless communications system is jarring, yet appropriate. Indeed, a key mission of the Iridium venture, an ambitious satellite network project managed by Motorola, is to bring telecommunications to remote, undeveloped areas around the world.

Later this year, McDonnell Douglas Corp. Delta II rockets will launch the first of Iridium's 66 low-orbit satellites to support a wireless voice and data communications network around the Earth. The network will dwarf the next-largest man-made constellation, the U.S. government's 24-satellite Global Positioning System. Scheduled to be fully operational in 1998, the Iridium network will enable seamless, point-to-point communications anywhere on the planet. Motorola is the largest investor in Iridium Inc., an international investment consortium that will market the service as an alternative to cellular phone networks for global business communications and as the sole telecommunications link for the world's most isolated villages.

In a project of this magnitude, management challenges abound. Some 6,000 engineers, technicians and business administrators in Canada, Ireland, India, Germany, Italy, China and the United States have a hand in building and launching the satellites as well as constructing systems to maintain their positions in space and route calls. These systems will log in at about 15 million lines of code, making Iridium one of the largest software projects ever attempted in the commercial realm. With competitors such as Loral Corp./Qualcomm and TRW Inc. hot on Motorola's heels, keeping Iridium on schedule is critical. Although Motorola management is confident Iridium will go to market at least a year ahead of its competitors' offerings, the company can't afford to let the schedule slip; as always, being first means garnering the lion's share of business. What's more, Motorola's contract with Iridium Inc. for development and deployment is for a fixed fee of \$3.4 billion, so any cost overruns will eat into profits.

GROUND CONTROL

PHOTOGRAPHY BY DAVID SCHMIDT

The Big Picture

As an orbital satellite network, Iridium will be accessible everywhere and won't have the reception black holes that plague Earth-bound cellular systems, whose signals sometimes drop out behind skyscrapers and hills. Iridium will enable business travelers to have one wireless provider worldwide with no gaps in coverage, even allowing calls from airplanes in flight. It will also bring telephone service to remote villages in Africa, islands in Polynesia, settlements in the Arctic and any place not reached by telephone wires or within range of cellular antennas.

Though few CIOs can expect to manage a project that will bring telecommunications to the remote corners of the Amazon rain forest and the arid wastes of the Gobi, Motorola's methods of organizing and managing the work and the ways in which the company is minimizing the venture's risks can be applied to virtually any project. No one knows this better than Motorola Vice President Mark Borota, manager of the Iridium Program Office. The project represents the biggest management challenge in his 24-year career.

Divvying Up the Work

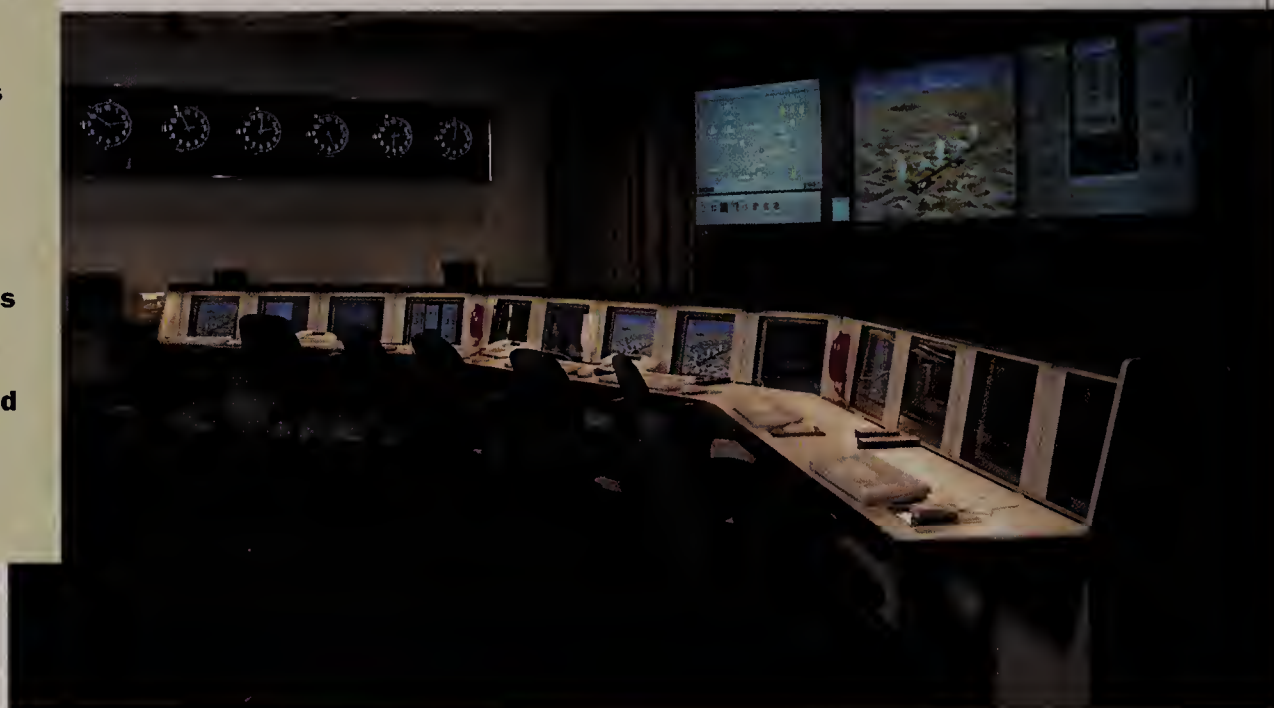
Borota quickly realized that for a project of this nature, "the more homework you do upfront, the better the chances of success." For Motorola, choosing the right partners and vendors to help tackle this enormous project may have been the most important assignment of all. The goal was to find highly competent partners with the right technical expertise that also shared Motorola's open management philosophy and its commitment to a formal development methodology.

Despite a rigorous interview process, the excitement of the Iridium project drew thousands of applicants eager to work on something unique, Borota says. Starting in 1990, three years after initial project planning began, Motorola's Iridium managers met several times with each prospective partner's project team and executive managers. To win acceptance,

partners include the well known (Raytheon Co., Scientific-Atlanta Inc., Siemens Corp., Hewlett-Packard Co.) and the lesser known (Iona Technologies Ltd., Essex Corp., Sente Inc.).

Orchestrating Teamwork

With so many players involved, communication breakdowns could easily derail the project. To prevent that,



MISSION CONTROL: Engineers will monitor Iridium network satellites and manage their positions in space from this command center in Chandler, Ariz.

would-be partners had to pledge to be upfront about any problems that could throw off the schedule. In addition, Motorola evaluated each candidate's software development and maintenance practices against the Capability Maturity Model for Software developed by the Software Engineering Institute (SEI) at Carnegie Mellon University in Pittsburgh. Partners that fell short of Motorola's methodology requirements received a crash course in SEI principles.

Ultimately, Motorola chose 17 partners. Bechtel National Inc. of San Francisco, a major engineering, procurement and construction contractor, is responsible for construction of the ground stations that will connect the 66 satellites to Earth. Lockheed Martin Missiles & Space of Sunnyvale, Calif., is constructing major satellite components; McDonnell Douglas of Huntington Beach, Calif., is readying the Delta II rockets that will launch many of them. Other

Borota's project management staff organized contractors and Motorola teams into seven task-defined segments, each devoted to a particular subsystem or function, such as payload software, satellite ground control and systems engineering. Each segment, led by a Motorola manager, was divided into product teams responsible for components such as software modules and test procedures. Product team managers oversee day-to-day operations of segment components, including the activities of contractors. Each product team has its own cost and scheduling goals, and most work closely with other teams. For example, hardware and software engineering teams working on the same component are closely aligned, enabling frequent testing of code on the machines on which the software will actually run. Segment managers keep close tabs on budgeting, scheduling and quality issues faced by their product teams.

A very large, meticulous flowchart hanging in Borota's office illustrates the painstaking detail necessary to manage this project. Produced with Primavera Project Planner from Primavera Systems Inc., it has four layers of scheduling: a master schedule, primarily for executives; a second, overview layer with more detail; a third layer with more-specific segment schedules for segment managers; and product teams' schedules containing what Borota says are "almost hourly plans." Although the master schedule is updated every month, the scheduling software lets collaborating product teams link their schedules and revise them weekly—sometimes daily. So if one team falls a week behind, the software automatically adjusts the schedule of the team next slated to pick up the ball.

Since some 1,000 out of about 20,000 individual system components involve the interaction of two or more teams, keeping on top of the schedule is a full-time job. Enter Dennis McIntosh, a Bechtel employee and

tor of day-to-day operations, McIntosh must have a clear view of how the pieces fit together; he relies on Primavera Project Planner to accurately track progress and quickly spot scheduling bottlenecks. When a portion of the project falls behind, segment managers may choose to reassign personnel from other teams to help out, hire more contractors or accelerate another part of the project to offset the delay.

Erasing Geographical Boundaries

To facilitate collaboration among a workforce spread out across the globe, all development teams have been given access to Motorola's private network, which accommodates IBM, Macintosh and Unix platforms. Thus, developers in India can send files and e-mail instantly to teams in Italy and the United States. Teleconferencing and regular face-to-face meetings also support the Iridium

Getting a Handle on Costs and Risks

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Estimating tools help Motorola watch the clock and the bottom line

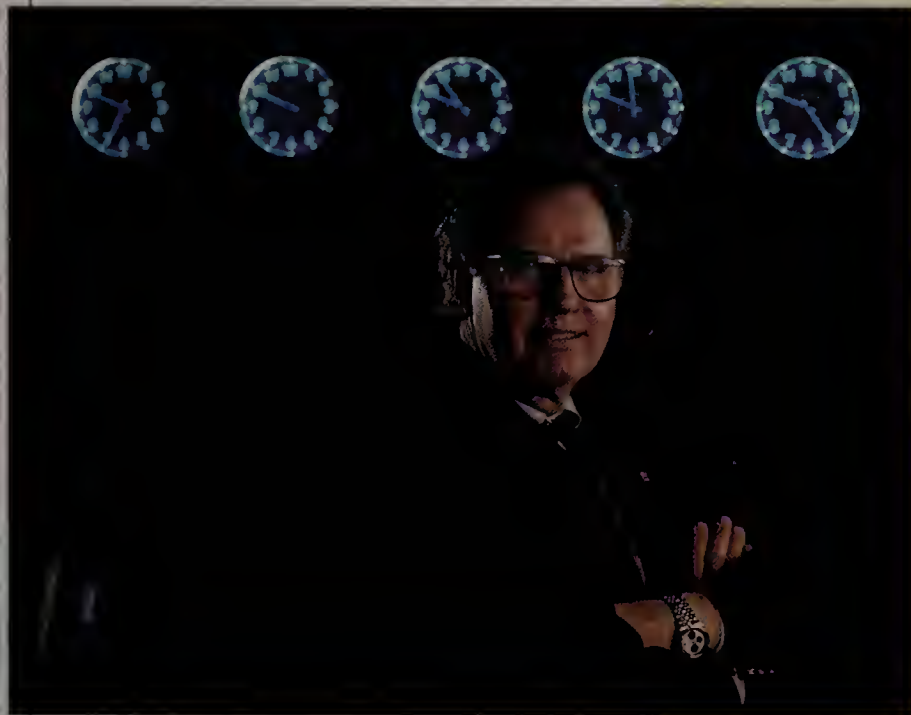
In the quest to perfect Iridium's design, revamping systems on the fly is all part of a day's work for the project's engineers. Although that could create tension between engineers focused on excellence and bean counters worried about the budget, Motorola's emphasis on teamwork prevents wars between the two sides. Cost estimators and engineers meet face to face to hash out major change proposals, according to Bob Bailey, who leads the project's cost-estimating department. Bailey's department provides reality checks on design changes by assessing costs, scheduling impacts and risks.

A key tool for Bailey's group is Seer, a package of cost-estimating tools from GA Seer Technologies, a division of Galorath Associates Inc. Bailey's team enters data such as the number of lines of code or objects needed for an application, the number of programmers available, the time frame, the type of application, whether new or existing code will be used and the level of integration needed. The program crunches that data and delivers application cost, scheduling and risk estimates. Seer features a knowledge base culled from thousands of completed software projects that provides likely real-world scenarios even if engineers aren't sure exactly how many

lines of code will be needed for a given application. Seer can also be used to compare the cost, scheduling and risk factors of a software solution with embedding that system on a chip.

Motorola has taken great pains to carefully plan and stick to a realistic schedule, says Daniel D. Galorath, president of Galorath Associates. "A lot of people just sort of let software [projects] happen," he explains. Contrary to popular opinion, however, he believes that "software development is very controllable."

—P. Fabris



BOB BAILEY'S department keeps an eye on the clock—and the budget.

veteran manager of many large government and private sector projects, who serves as Iridium's project controls manager. He compares the Iridium project's structure to that of an onion—layers upon layers of interconnected functions. As the conduc-



DURRELL HILLIS insisted on using proven technology to minimize risk.

project's nimble development approach. Every other month, Borota hosts an all-day meeting at project headquarters in Chandler with vice presidents and hands-on project managers from all 17 partners. Some contractors contributing to the Iridium effort work in far-flung locations, but between 400 and 500 systems analysts and software engineers from strategic partner companies—personnel who need to work most closely with other groups—are based in Chandler. “We strongly believe in collocation,” Borota says. “That shortens communication cycles.”

Flexible Paths to Fixed Milestones

According to a 1994 study by Standish Group International Inc. of Dennis, Mass., only 9 percent of large companies' software projects come in on time and on budget. So far, Iridium is bucking the odds. Halfway into the project, Borota's management team has kept software programming humming along in a steady rhythm. As of mid-December 1995, 23 of the system's 47 major contractual milestones had been completed on or ahead of schedule and under budget. Although most milestones

represent major events—such as launching the first satellite or completing operational tests at the master ground-control facility—they are good indicators of software development progress as well because software is integral to most steps. What's more, each milestone reached paves the way for the successful attainment of the next and enables the company to “retire significant financial and scheduling exposure risks,” Borota says.

Although major milestones in the project are fixed, a gargantuan project like this encounters plenty of unforeseen hurdles. To cope with these hurdles, managers built flexibility into the development process. In some cases, two contractors may work out design issues themselves without any intervention from Motorola personnel—the “empowered employee” concept extended to contractors. Simply put, if contractors discover ways to reduce risk or improve a component, they are encouraged to pursue their ideas as long as the new tack won't throw off the master schedule.

Originally, Motorola's project management team handled scheduling

and budgeting for each system component, but that strategy proved too limiting. “We found that the best people to define the next [stage of a] build were the people working on it,” Borota says. Partners are therefore playing a larger-than-anticipated role in documentation, budgeting and risk assessment. Motorola strives to accommodate the needs of partners as much as possible, Borota says, because allowing them to achieve their objectives strengthens their commitment to making the project work. “We don't want to foster an attitude of ‘don't do anything not specified in the contract,’” he explains. That doesn't mean that any-

Project Toolbox

Project management tools

PRIMAVERA PROJECT PLANNER scheduling software from Primavera Systems Inc. of Bala Cynwyd, Pa.

SEER cost-estimation tools from GA Seer Technologies, a division of Galorath Associates Inc., Los Angeles

Development tools

ORBIX an object request broker product from Iona Ltd., Dublin, Ireland

TOOLS.H++, a C++ foundation class library from Rogue Wave Software Inc., Corvallis, Ore.

G2, an object-oriented expert system from Gensym Corp., Cambridge, Mass.

ISIS SOFTWARE DEVELOPER KIT from Isis Distributed Systems, a subsidiary of Stratus Computer Inc., Marlboro, Mass.

thing goes, however. A technical review board meets weekly to assess change proposals. “Most changes involve a trade-off between technology [sophistication] and schedule,” Borota says.

Minimizing Risks

Even if collaboration, scheduling and communication are managed flawlessly, a development project of this scale still teems with risk. Early on, Durrell Hillis, the Government and Space Technology Group's senior vice

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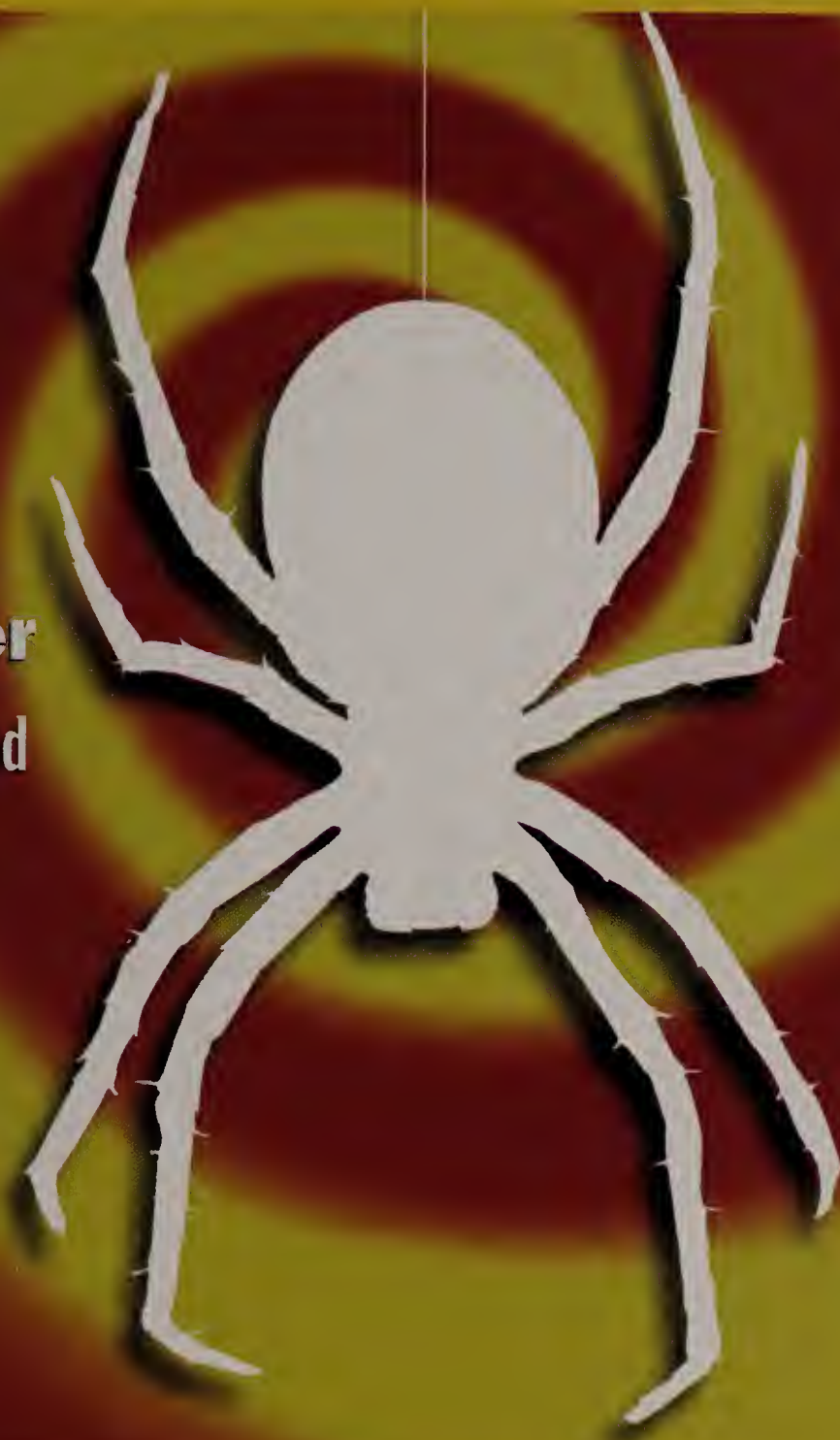
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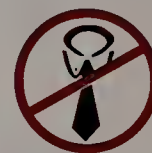
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president and general manager, insisted on dependable, existing technology for all areas of the project—software, hardware, rockets, test equipment. “All the technology has to be proven in one way or another,” he says. “We couldn’t allow any inventions, because we needed to concentrate on pulling together so many fundamental basic technologies.”

Of the 15 million lines of code that will run the Iridium network, only two million lines will be written from scratch. Although software projects of just one million lines of code are rife with risk, Motorola has reduced the overall peril by relying on existing, time-tested software modules for the bulk of the software build. Developers are using some legacy satellite control and monitoring software designed by Motorola for previous projects along with off-the-shelf products that handle such tasks as orbit determination, statistical analysis and network management using SNMP. As a result, engineers aren’t investing as much time debugging software as they would if they were designing everything themselves.

New sections of code are thoroughly tested at all stages to contain bugs at the lowest level possible, and defect rates are tracked carefully to determine whether continuous improvement goals are met. Through such practices, Iridium has reached level three of the SEI Capability Maturity Model for Software; attaining level four is a goal for 1996. (The model grades programming projects on a five-step management scale: Level one represents total chaos and level five, fully optimized control. See “Out-of-this-World Software,” *CIO*, Feb. 15, 1995.) Motorola hired specialists in SEI methodology to train staff and partners alike and even extended SEI standards beyond the realm of software. “We have taken the SEI methodology and applied it to systems engineering, including hardware and resource allocation requirements,” says Borota.

To reduce risk further, the design team chose a distributed object-oriented development approach where-

by a common series of software objects provide access to all of the underlying software components. That strategy lets different product teams develop related products concurrently, enabling, say, a team working on a portion of the payload software to improve its design without forcing other payload software teams to rewrite the interface code. Although

the potential risks so that we can plan ahead and know where we might have to spend more money.” To date, Motorola has developed contingency plans for 135 scenarios. For example, managers felt they needed more extensive testing of ground-to-satellite communications earlier than planned. So they decided to bring the satellite master ground-control



ASSEMBLING THE FUTURE: Workers build the satellites that will make up the Iridium network.

some design changes in one software component will require some recoding in another, the distributed object approach helps minimize that. It also allows pieces of code to be reused, speeding the programming process.

Scenario Planning

Risk minimization strategies extend well beyond software development. Managers regularly identify the most risky scenarios and develop mitigation strategies for each possibility. (For an overview of scenario planning, please see “Into the Futures,” *CIO*, Dec. 15, 1995/Jan. 1, 1996.) A representative from each segment serves on a cross-functional risk and opportunity management team that meets monthly to hash out new risk scenarios. Borota’s monthly project progress review meetings also feature critical looks at the top three risks each segment faces.

“We are constantly assessing where our weakest links are,” Borota says. “This helps us understand

facility in Virginia online nine months ahead of schedule.

But Iridium managers’ relentless search for weak links and problematic what-ifs is all in the service of realizing the scenario that keeps them going: Sometime in 1998, a remote Indian village in the shadow of the Himalayas will make its first telephone call ever and the CEO of Acme Widget Technology will receive an urgent e-mail from the home office while cruising 25,000 feet over the Atlantic. These users won’t know that the systems making their communications possible required one of the largest telecommunications development efforts in history. And that’s just as it should be. By the time Indian villagers and the Acme CEO use the service for the first time, engineers on three continents will be working on Iridium 2, the system’s next generation. **CIO**

Staff Writer Peter Fabris can be reached at pfabris@cio.com.

HIGH-WIRE ACT

When IS technology is given a more prominent role at a family-run wire and cable manufacturer, the journey from tradition to the modern can be more dangerous than a tightrope walk

EDITED BY CHRISTOPHER KOCH

FOR MORE THAN 70 YEARS, Paulsen Wire Rope Corp., our family-owned business, has spun the wire ropes that haul people in elevators, keep suspension bridges aloft and drag cable cars up those impossibly steep hills in San Francisco. When our less visible core markets—the construction and oil industries, for example—suffered through the recessions of the '80s, we followed suit, with the added burden of battling eager Korean competitors entering the U.S. market. Our response was typical of a company under stress: We expanded into new, unfamiliar markets and chased market share without enough attention to the costs or the perils of trying to be all things to all customers.

But our response aggravated the weaknesses in our manufacturing planning and control processes, both of which relied too heavily on the educated guesses of veteran shop-floor employees. For example, if a customer of-

fered us a chance to deliver rope on an accelerated schedule, we couldn't predict what effect that acceleration would have on our existing commitments. We made promises we had trouble keeping, and gross margins dwindled as we struggled to make more and more deliveries.

After watching revenues slide 25 percent during the '80s, we concluded that cutting costs wouldn't be enough to lift us above our troubles. We needed to merge shop-floor intuition with information systems to create an efficient integrated manufacturing planning and control system, a combination we believed would supply us with a necessary perspective across processes. We also believed formal planning tools would help us improve manufacturing cycle times, schedule changeovers effectively and manage capacity—increasing productivity far beyond what we could achieve through cost reductions alone.

We knew the job wouldn't be easy.

SUBJECT

Paulsen Wire Rope Corp.
Sunbury, Pa.

Industry: Wire rope for commercial and industrial uses

Revenues: \$22 million

Total Employees: 200

IS Staff: Three

Business Executive: Hood Johnston, CFO

IS Executive: Tim Ryder, MIS manager

OBJECTIVES

- Create an integrated manufacturing planning and control system to improve productivity and help restore profitability
- Update project planning without losing valuable momentum
- Create an institutionalized cross-functional project planning process
- Encourage system users to accept ownership of their applications

CONCERNS

- What can we do to increase user involvement in application development and education?
- How can we balance the desire for quick systems implementation with the need for longer-term planning?
- How can IS maintain enthusiasm and support among users during implementation?



TIM RYDER (left) and HOOD JOHNSTON: *We need ways to renew employees' commitment to the system.*

PHOTO BY EUGENE MOPSIK

IS traditionally existed to serve the whims of our very independent function heads, creating separate applications for operations, sales and finance. In addition, we had a persistent cul-

ture that put IS—not the user—in charge of withdrawing information from the machine. With little ability to coordinate across functions, information on everything, including job costs and inventory availability, was incomplete and inconsistent.

In mid-1995, we began the migration from our fragmented system to an integrated manufacturing planning and control system from CMS Manufacturing Systems of Toronto. To oversee the transition, we created a systems project team. To nurture a sense of enterprisewide collaboration and cooperation during implementation, we made certain that each function had team representation.

Nevertheless, progress has been



CARL WILSON
Georgia-Pacific Corp.



JOHN PASCUCCI
Ames Department Stores Inc.



NAOMI KARTEN
Karten Associates



GENE RAPHAELIAN
Gartner Group



BRUCE STEWART
Gartner Group

- **How can the project team remain an effective model for cross-functional cooperation in the long term?**
- **What other improvements might IS consider to help in the turnaround?**

difficult. Some managers resented the fact that we invested scarce resources in software instead of production equipment upgrades. Also, the system was the first exposure for most users to an integrated manufacturing system, and they underestimated the time required to develop and review data and to im-

"After watching revenues slide 25 percent during the '80s, we concluded that cutting costs wouldn't be enough to lift us above our troubles."

—Hood Johnston and Tim Ryder

plement the applications. We received some third-party general MRP II training when we started the project, but budget constraints have forced us to rely on software vendors for application-specific training, which stops short of teaching how the application fits into our overall picture. Without adequate training, function heads and shop-floor employees may fall back on the old ways of doing things.

Meanwhile, our project team is struggling to plan the next phase of the project while implementing applications for the current phase. Financial and purchasing modules are up and running, but the core production applications await. If we take too much time updating our project plan now, we'll lose valuable momentum. Is there an acceptable balance between pushing the project ahead and spending time on short- and intermediate-term planning?

Finally, we worry about maintaining the project team's nascent cross-functional cooperation and enthusiasm. We've reaped the so-called low-hanging fruit and are now climb-



CARL WILSON: *IS staff typically make up 3.2 percent of the workforce in the average manufacturing company.*

ing higher to the tougher production processes. We need ways to renew employees' commitment to the system, the life rope for pulling us back to profitability.

Hood Johnston, CFO, and Tim Ryder, MIS manager

Carl Wilson, *vice president of information resources, Georgia-Pacific Corp.*

You at Paulsen have made significant progress in solving your problems, first by revamping IS and second by establishing a project team to build cooperation among all those independent business heads. I'm also encouraged by the fact that you've recognized the most difficult problem any systems project like

this faces: business and user buy-in.

Before Georgia-Pacific's transition to a value-adding business partnership with information resources in 1993, IS was viewed as a subordinate service center, as seems to be the case in your company. We've moved out of that mind-set, and your company must do the same. Only when IT is a direct component of the product or service you provide can IS be the driver behind the project. Too many good systems add nothing to the bottom line because they weren't absorbed into the fabric of the business—users ignored or worked around the system because it came from IS, not them.

The only way out of that situation is to enlist your CEO as leader of the project; at Georgia-Pacific, Chairman and CEO A.D. Correll visibly leads

**“Only the CEO
can guarantee
cooperation, rather
than mere
compliance, from
division heads.”**

—Carl Wilson

our business process improvement efforts. The separate department heads must realize that this isn't merely a new computer system but a part of your company's overall business survival strategy.

Only the CEO can guarantee cooperation, rather than mere compliance, from division heads. A clear, unequivocal display of support for the project from the CEO will enforce the message: Resist getting involved and risk losing your job. But threats aren't enough to guarantee anything besides staff terror. One of the better management tools is positive reinforcement via compensation. Assuming you have some performance bonuses built into your compensation scheme, consider allocating a significant chunk, say 60 percent, toward successful implementation—enough to get everyone's attention but not enough to interfere with productivity and efficiency rewards. The bonus scheme should be available to everyone in the company since the goal is to clarify the importance of this project to the entire company's future. When I was with the Pillsbury Co., CEO Paul Walsh made the success of the information systems initiative a key component of senior line management's annual performance and compensation reviews. The positive impact on the business was quickly evident.

The CEO should personally conduct reviews of the project and talk to the team members on a regular basis. The CEO's personal presence, his questions and his continuing interest will go a long way toward shaping the level of enthusiasm for the project within the company.

It sounds, Mr. Ryder, as though you and your staff of two are overworked. According to research by Computer Sciences Corp., IS staff typically make up 3.2 percent of the workforce in the average manufacturing company. If that ratio were applied to Paulsen, you would have seven IS staffers. If you can afford new staff, hire business-savvy technology people, not programmers. If you can't afford staffers, consider IS consultants.

If resources remain tight, there are two final strategies to consider. One is the so-called “80/20 rule.” Your project team may be striving

needs to step up and take a stronger role, but never forget that while you may not get credit for the project's success, you will certainly be held accountable if it fails. So in addition to everything else you have on your plate, be a project activist. Prior to joining Ames, I worked for a much smaller company in similar circumstances to yours. When I arrived as vice president of MIS, the department was in a shambles, and the business wasn't faring much better. Outdated processes were overseen by functional heads who thought more about their own fiefdoms than their contribution to the business.



JOHN PASCUCCI: *While you may not get credit for the project's success, you will certainly be held accountable if it fails.*

for perfection before moving on, but it might be better to get the system up and running with 80 percent functionality and then refine it later. Second, your team could take care of implementation and planning issues if it split into two and divided the responsibilities of strategies and tactics.

John Pascucci, senior vice president of MIS, Ames Department Stores Inc.

You need to think carefully about your role in the systems project, Mr. Ryder. Senior management

Luckily, my CFO was willing to take them and the business processes on. Eventually we enabled the business and IS to work together.

The most important lesson I had from that work was to be as active as my CFO in building and maintaining support for the project, even though my power was limited. You need to extract business information from functional heads and get them to justify the ways they would like to see the business reflected in the new system. You can be the individual who builds enterprisewide cooperation and trust by helping each functional head understand the needs of the others.

Panelists' Findings

- Enlist the CEO to become project leader and help galvanize support for the business turnaround project
- Create compensation programs aimed at specific project goals
- Create a bridge-building role for IS by helping each function understand the needs of the others
- Create an ongoing committee charged with searching for cost-saving and revenue-generating opportunities
- Focus on a small number of clear, short-term goals that will bring business benefits and help maintain momentum for the larger project
- Use a "learning lab" to create lead users who can help train others
- Hire an experienced outside project manager or consultant to build commitment to the project and act as objective arbiter between users and the project team
- Schedule regular facilitated discussions among team members that center on strengthening their ability to work together
- Offer more information about the new system through IS-sponsored presentations, reports, demos, Q&A sessions and one-on-one meetings

All this talking enables you to discover where majority opinion lies in terms of prioritizing the company's and system's needs. You can then begin to judge what is critical to the business and what isn't and then share your new insights to help educate functional heads in a nonthreatening way about what the new system is and how it works. I think of IS's role as being like that of flying instructors: We teach others how to pilot the jets and get them off the ground—we don't fly the planes for them.

Since you're overbooked, try to get some temporary staff to do some of your department's day-to-day work while you devote yourself fully to the project. That option could set a precedent for the various functional heads to free up some of their key users for an intensive lab simulation of the new system. That way, you can find some lead users who can train others in their departments.

Also, at a lab simulation, the vendor should be able to open some doors for you at other client companies so you can learn about successful systems and how other users

tackled training issues.

At Ames, we have an IS steering committee composed of IS and business leaders that hammers away at systems projects to see what's really

I think of IS's role as being like that of flying instructors: We teach others how to pilot the jets and get them off the ground—we don't fly the planes for them."

—John Pascucci

necessary on a cost-for-value basis. That's a design you should consider. We prioritize projects and get everyone to agree on the 20 percent of the project that is absolutely necessary and use those pieces to lead our im-

plementation. We also have a "Profit Improvement Committee" charged with constantly seeking ways to cut costs and create new revenue opportunities. Many of our ideas require systems enhancements. The procedure is a way for me to keep track of systems issues and build cross-functional cooperation in the process. We ferret out opportunities for cost savings that pay for training and implementation.

Once the system is completed, you can use it as the basis for continuing with your cross-functional team. There's always some fine-tuning to be done, and user groups always have more demands than there are resources. You can take advantage of that by creating a kind of permanent steering committee or your own "profit improvement committee" that keeps track of business and systems issues and builds cross-functional cooperation in the process.

Naomi Karten, *president, Karten Associates*

When companies make major technological changes, they tend to become preoccupied with processes while ignoring the people issues. It's not hard to understand why. Changing the way work is done is a lot easier than changing the way people relate to one another and their jobs. Yet the human factors



NAOMI KARTEN: *Building a foundation for cooperation needn't be a lengthy or costly process.*

will determine success or failure in the end, as you at Paulsen are discovering. There are three major issues to consider:

■ **Relationship building.** A group such as your cross-functional team will tend not to be cohesive and mutually supportive, particularly given its members' different perspectives, responsibilities and organizational loyalties. Without steps to build the foundation for a strong, enduring relationship, any initial sense of team cooperation may falter as project workloads, complexity and the inevitable delays and difficulties arise.

Building a strong foundation for cooperation needn't be a lengthy or costly process. It can emerge from as little as one or two days of facilitated discussion that centers not on the team's technical challenges but on what team members are each willing to do to strengthen their ability to work together.

Of the many questions I pose when trying to help IS staffs and their business counterparts build better relationships, two of the most effective have been: First, what do you need from the other person or group so that you can work together effectively? And second, what are you willing to do for the other person or group so that you can work together effectively? Discussion revolving around such questions can be instrumental in creating a team characterized by caring and cooperation. Yet even strong teams need time for team maintenance, reflection and renewal. It is wise to devote at least a half-day per month to recognition of what's working well, analysis of what isn't and discussion of what the team needs to do to ensure continued success.

■ **Information.** In times of change and uncertainty, people have an intense (though rarely articulated) need for information. They want to know what is happening and how it will affect them. Readily available information can help to reduce resistance to change and increase buy-in. Therefore, you and your IS staff should offer more information about the implementation of the new sys-



BRUCE STEWART: *Focusing on business goals will build confidence in the project.*

tems and processes. For example, presentations to functional groups, status reports, Q&A sessions, demos and one-on-one meetings can be helpful in reaching different groups of employees. Often, the evidence that IS is willing to keep its users informed is as important as the precise information communicated because it tells the users that they are an important and integral part of the process.

■ **Customer involvement.** Your objectives indicate you are eager to "encourage system users to accept ownership of their applications." But no one can persuade users to do willingly anything they don't want to do. They may do it, especially if they don't have a choice, but that doesn't mean they'll like it. However, users are often surprisingly willing to take ownership if they understand how they will benefit and if they've had a say in the matter.

When trying to win over users, it's generally advisable to include them as early in the effort as possible and in as many ways as possible. For example, invite users to help explore ways to improve training. Ask a representative subset of users for help in devising ways to ensure that employees don't fall back on old techniques. Help those users understand the benefits

to them of taking responsibility for their applications and solicit their ideas about how to communicate those benefits to their co-workers. IS people often falsely assume that users can't come up with good solutions to problems that affect them. Yet they can, and when given the opportunity, they do. Because they bring a perspective to problems different from their IS counterparts, their solutions usually differ from—and may be better than—IS solutions. And users, like people everywhere, will tend to have greater ownership of ideas that are their own.

Gene Raphaelian, vice president and research director in the Gartner Group's Industry Service, and **Bruce Stewart**, research area director in the Gartner Group's Management of Information Technology Research Center

Your problems with the integrated manufacturing project are classic. It appears as though the organization has embarked on a large-scale project without the support of critical IT stakeholders (i.e., Paulsen's chief executives and heads of the functional units) and with an IS organization that is not consid-



GENE RAPHAELIAN: *Successful business leaders do not delegate IT decisions.*

ered a partner by the business people. In some ways it sounds as though your company has tried to solve too many problems with a technology application.

Yours is not a "runaway application" situation, but the organization needs to move quickly and decisively to put the project on the right track. The first step is to hire an experienced project manager. Too often, IT project management is thought of as an inherent natural skill when in fact it is a critical competency that is lacking in many organizations.

Indeed, many of our clients tell us they are committed to making project management a core IT competency. Many have standardized on project management tools and methodologies, hired outside project management experts to act as mentors to those in training and sent key staffers to project management "top gun" school. The feedback from clients who have made these investments is that the short- and long-

term payoff has been immeasurable.

First, bringing in an experienced project manager to your company would demonstrate an organizational commitment to the project and rally key user stakeholders to fulfill their responsibilities in project implementation (e.g., applications design or training). Sourcing this skill from outside may also serve to break a "communications logjam" between users and the project team. An outsider may be able to speak frankly with contentious parties and defuse the emotion and turf issues that can prevent action.

Second, the project team should revisit the project plan and redefine tangible short-term goals that will show "real" business benefit. The team must help the stakeholders define what is critical to them and to the business as a whole. That approach will allow the team to focus on one or two critical objectives in the near term and provide quick business benefit based on business

priorities. Focusing on business goals will build confidence in the project and may serve to shore up the coalition. At the same time, the team should plan in parallel the next

"Too often, IT project management is thought of as an inherent natural skill when in fact it is a critical competency."

*—Gene Raphaelian and
Bruce Stewart*

two "releases" of the project. This will provide stakeholders with a clear road map and set of assumptions for costs and resources needed to accomplish follow-on phases of the project.

Mr. Ryder, you must do whatever is necessary to move beyond an implementation role and help build the critical stakeholder coalition that will give life and power to your project. That means constantly communicating, marketing and negotiating with business stakeholders to address roles, responsibilities, resource issues and critical business objectives.

Last, your executive management (i.e., CEO) needs to step forward and reestablish the importance of this project in the minds of the business unit heads to throw the full weight and support of the executive office behind the project. Today's successful business leaders do not delegate IT decisions, especially ones upon which the success and survival of the business depend. The functional unit heads should not be allowed to sit back and say, "I told you so." Without strong, decisive leadership at the executive and project level, it seems as though your integrated manufacturing application is in danger of becoming "shelfware," compromising your long-term business prospects in the process. **CIO**



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at a
HIGHER
level.

Tactical Maneuvers

Leveraging the IS organization to create business allies is the strategic message delivered at the CIO-sponsored Enterprise Value Retreat

BY MEGAN SANTOSUS

CIOs charged with contributing strategic or financial value to their organizations often suffer shell shock. Integration, application and infrastructure challenges that explode on impact arrive swift as a blitzkrieg. According to F. Warren McFarlan of Harvard Business School, battered IS pros are under siege. "You make an investment today," he explained, "and it's going to look crummy three to four years from now."

McFarlan delivered this dose of reality as facilitator at CIO Communications Inc.'s fourth annual Enterprise Value Retreat, held in January at the Arizona Biltmore in Phoenix. McFarlan peppered his discussions with insightful and wry anecdotes. (One attendee likened him to a cross between Ed Sullivan and Maxwell Smart.) The event (called the ROIT Executive Retreat in past years) provides a forum in which IS practitioners learn and share ideas about using technology to achieve significant business benefits.

McFarlan, who is senior associate dean, director of external relations and Ross Graham Walker professor of business administration at Harvard, drew on his years of case study experience to offer practical insights on how CIOs can guide their departments, companies

and careers through the struggles ahead. McFarlan frequently made connections between the theoretical points he emphasized and actual case studies.

McFarlan urged the 175 attendees not to adopt a defensive posture in the face of technology's onslaught. "Over the next few years, resources at our fingertips are scheduled to multiply," he said. The integration of video, computer, telecommunications and fax technologies will present seemingly unlimited ways of improving efficiency and delivering products and services. Instead of running scared, CIOs should proactively seek out and apply new systems. "Technology has the ability to change fundamentally the nature of competition," McFarlan said. "The action is in implementing IT."

Creative Alliances

McFarlan believes that challenge offers CIOs a rare opportunity. By leveraging IT, he said, CIOs can facilitate new ways of reaching customers and doing business. In short, McFarlan urged CIOs (and businesspeople in general) to think creatively in terms of forming new alliances. CIOs who facilitate such alliances will transform themselves into valued corporate players, McFarlan said.

As an example of a creative alliance, McFarlan cited the American Airlines Inc.-Citibank agreement that combines a credit card with a frequent flyer program. Initially, Citibank approached American Express Co. Inc. with the idea but was summarily rebuffed by executives suffering from a distinct lack of foresight. Today, as Citibank and the airline continue to profit nicely, American Express struggles to shore up lagging market share. McFarlan characterized that American Express decision as one of the worst



F. WARREN MCFARLAN (above): Technology has the ability to change fundamentally the nature of competition.

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business moves of the 1980s.

McFarlan noted that skill sets of IS professionals and users may not align with new technologies and that the IS organization may have to undergo a fundamental transformation. CIOs must ensure the stability of networks because uninterrupted communications will increasingly be an important part of operations. CIOs should serve as internal systems integrators and leave the day-to-day programmer management to a technician or simply outsource it.

Hands-on Case Study

The Enterprise Retreat offered more than an opportunity to listen to McFarlan's musings; attendees actively participated in a simulation of complex executive decision making. In advance of the session, each of McFarlan's audience members was supplied with a 1995 Harvard Business School case study profiling the H.E. Butt Grocery Co. (HEB), a San Antonio-based chain beset by competition and cost pressures. The subsequent activity was no vague abstraction: Jack Brouillard, HEB's chief administrative and financial officer, was present to hear final recommendations.

In 1992, HEB was a \$3 billion-plus company with stores throughout southern Texas. In response to competitive threats posed by the likes of Wal-Mart Stores Inc. and other discount retailers of consumer products once found exclusively in grocery stores, HEB abandoned its traditional product-centered buying processes and adopted processes based on broad merchandise categories. The goal of category management was to drive supply channel costs down by integrating marketing and procurement functions. HEB gave category managers significantly more decision-making responsibility, which required new skills and capabilities of them. As a result, HEB had to replace all but one experienced buyer.

As had several of its discount competitors, HEB adopted everyday low prices. While the strategy improved customer loyalty, HEB watched its margins become razor-

thin, further intensifying its need for greater efficiency and reduced costs.

The Harvard case study detailed how at the same time HEB was meeting its greatest challenge, the

**"We spent \$1 million
with a consultant, but
I think we picked up
more for free here."**

—Jack Brouillard

industrywide introduction of Efficient Consumer Response (ECR) was creating managerial and technical innovations that redefined the supplier/retailer relationship. The long-standing process known as forward-buying, or buying products far in advance of demand, had often wreaked havoc on inventory and pricing; now, by implementing ECR on a wide scale, grocery retailers were more closely connected to distributors and manufacturers, totally transforming supply channel management.

Fortunately, McFarlan said, HEB was no stranger to IT. HEB's infrastructure included point-of-sale scanners, EDI links with suppliers that supported continuous replenishment, and a network of in-store computers used by store and category managers to track sales and orders. E-mail connected HEB's more than 200 stores with headquarters and greatly facilitated communications. Yet despite experience with an extensive IT infrastructure, McFarlan said, HEB as well as other retailers struggled with introducing ECR.

McFarlan asked the attendees to break into small groups to determine actions the company should take to improve profit margins and reduce costs.

Groups met separately for a few hours, during which time Brouillard made the rounds to offer feedback and monitor the progress of the discussions. The following day, four

groups selected by Brouillard and McFarlan presented their findings to the larger audience.

Wrap-up

The strategic use of IT to create new services and improve operations figured prominently in each group's suggestions. The groups also concurred that HEB seemed preoccupied with operations at the expense of paying attention to customers. Attendees suggested that by making much better use of data in its POS systems, HEB could tailor each store's merchandise to specific consumer needs. Such a move could maximize shelf space while providing a level of service not found in competing stores. Several groups suggested that HEB create a virtual store on the World Wide Web to facilitate home delivery and in-store pickup service. The notion of forming frequent shopper programs with area businesses such as dry cleaners was also a popular idea.

Following the presentations, Brouillard expressed his appreciation to the attendees for their advice. Although he acknowledged that HEB had been inward-focused and had not done a great job of managing store-specific merchandise, Brouillard was pleased to provide an update on the company's progress. With more than \$5 billion in revenues, HEB is now the 10th largest grocery chain in the country, he said. He added that the use of continuous replenishment and the move to ECR were proceeding, as were plans to expand operations into Louisiana and Mexico. "We spent \$1 million working with [a large consultant]," he quipped. "While it was a good experience, I think we picked up more for free here."

McFarlan wrapped up the retreat by emphasizing the ongoing need for CIOs to explore new ideas. "When you think you've learned everything in IT, it's time to retire and do something less stressful, like join the PGA tour." 

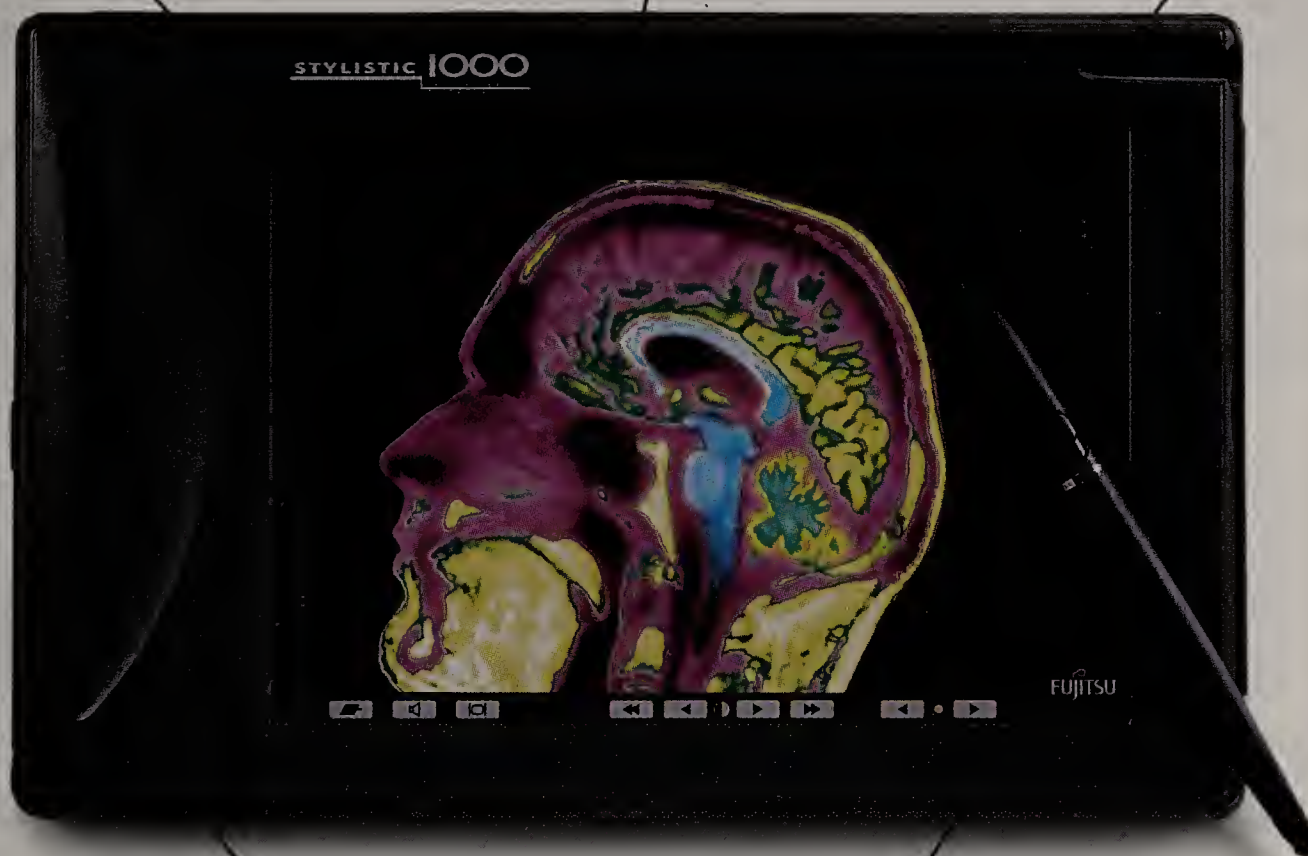
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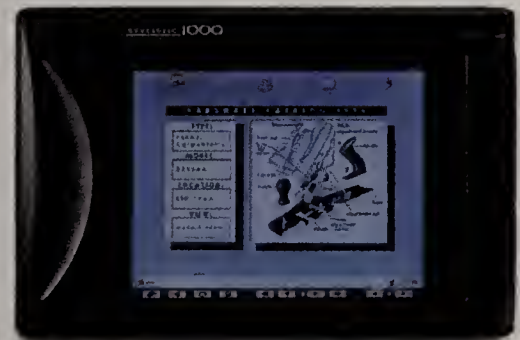
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Warehousing Wherewithal

Although vendors may try to convince you otherwise, no one yet can provide one-stop shopping for your data warehouse needs

BY ROB MATTISON

Hundreds of vendors of hardware, software and integration services claim to provide all the support a CIO would ever need to build a warehouse. But figuring out just what each vendor offers isn't easy, given the complexity of the technical, organizational, procedural and operational issues involved. Despite marketing claims, no single vendor can provide a complete, turnkey approach.

A data warehouse is primarily an operational middle ground where a large number of disparate and incompatible "legacy systems" are tied to an equally diverse collection of end-user workstations. Legacy systems, which usually comprise a hodgepodge of assorted hardware, software and operational systems accumulated over many decades, are by nature incompatible with one another and unique to each organization.

The chances are remote that any single vendor will be able to develop a product that can interface with all of them "painlessly." Instead, warehouse product vendors develop specialized capabilities to work with various environments.

In addition, each organization has its own particular combination of PCs, Unix workstations and "dumb" terminals. A separate set of specialized software, hardware and integration vendors is required to deliver consistent warehousing solutions to the desktop.

Of course, the complexity of the hardware and software used to store data and manage a warehouse will vary depending on what the company needs its warehouse to do—how much data must be stored, how quick response time must be, etc.

Three Warehouse Components

A data warehouse is made up of three very different functional areas, each of which must be customized to meet the needs of a business.

The first component handles acquisition of data from legacy systems and outside sources. There the data is identified, copied, formatted and prepared for loading into the warehouse. Many vendors' products assist in data extraction and preparation.

The second component of the warehouse is the storage area, which is managed by relational databases like those from Oracle Corp. or Informix Software Inc., specialized hardware—symmetric multiprocessor (SMP) or massively parallel processor (MPP) machines—or software. The storage component holds the data so that the many different data mining, executive information and decision support systems can make use of it effectively.

The third component of the warehouse is the access area. There dif-





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TRAVELING
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ferent end-user PCs and workstations draw data from the warehouse with the help of multidimensional analysis products, neural networks, data discovery tools or analysis tools. These powerful, "smart" data-mining products are the real driving force behind the viability of data warehousing. After all, what good does it do to store all this information without some way to understand it in new and different ways?

The majority of data warehousing software products available today focus on either acquisition, storage or access. Most companies providing these products have a proven track record for performing one of these jobs well. In fact, most have simply retrofitted existing products to meet warehousing requirements. That's no surprise; it simply doesn't make sense for a vendor to reinvent products that someone else has already created. Why would a company with an excellent data acquisition product try to write an entirely new database management system when that market is already so crowded?

As a consequence, most vendors maintain a single-function focus and partner with vendors of products from other categories. These partners then jointly offer "fully integrated solutions" that are nothing more than collections of disparate products that have been rudimentarily "integrated." Unfortunately, the degree and quality of the integration is often less than what the buyer thinks it should be.

Acquisition Products

The process of data acquisition is complex, tedious and costly. To make sense of the many different and often aged data sources, warehouse developers usually wind up spending an inordinate amount of time doing three things. First, they catalog all the data, developing an inventory of where it is and what it means. Second, they clean and prepare the data, extracting it from legacy files and reformatting it to make it usable. And third, they devote a lot of energy transporting data from place to place.

Although it is possible for companies to accomplish these tasks with-

A SAMPLING OF DATA WAREHOUSING PRODUCTS AND VENDORS

ACQUISITION PRODUCTS

Brownstone and InfoPump

Platinum Technology Inc.
800 442-6861

Carleton Passport

Carleton Corp.
617 272-4310

Integrity Programming Environment (IPE)

Vality Technology Inc.
617 338-0300

Prism Directory Manager

Prism Solutions Inc.
800 995-2928

STORAGE PRODUCTS

DB2

IBM Corp.
914 765-1900

OnLine Dynamic Server

Informix Software Inc.
415 926-6300

Oracle7

Oracle Corp.
415 506-7000

SQL Server

Sybase Inc.
800 879-2273

SOURCE: ROB MATTISON

out the aid of software (and many do just that), there is a host of products designed to help manage and automate the process.

Data inventory and catalog management is taken on by the vendors of metadata management products like Brownstone from Platinum Technology Inc. Most of these products are updated versions of the data dictionaries of the 1970s and 1980s. Data cleansing and preparation are done by new, specialized products such as Vality Technology Inc.'s Integrity Programming Environment. Some of these products include artificial intelligence code that can look at data and decide how it should be repaired in order to make it usable. Data transportation can be handled by simple system utilities or automated by products like Platinum Technology's InfoPump, which automatically extracts, cleans and delivers data nightly without human intervention.

Some data acquisition product vendors have begun to integrate several of these products into complete warehouse offerings. The biggest vendors in this category include Prism Solutions Inc., Carleton Corp. and Platinum Technology. Their product families include separate modules that perform the three acquisition functions.

Storage Products

The majority of warehouse storage today is being managed by relational databases running on Unix platforms. According to the Meta Group Inc., Oracle, Sybase Inc., IBM Corp. and Informix control 65 percent of the warehouse storage market; vendors of other relational databases and specialized databases are relatively minor players.

Storage management sometimes calls for more exotic and high-powered hardware solutions. When a typical Unix server or mainframe computer seems incapable of handling the envisioned workload, IS executives look for help from SMP or MPP hardware vendors.

SMP hardware is usually manufactured by the same people who make the typical Unix-based server machines (Sun Microsystems Inc., Hewlett-Packard Co., Data General Corp., Silicon Graphics Inc., IBM, etc.). These machines run a slightly modified version of the Unix operating system but take advantage of anywhere from two to 16 extra built-in processor chips. SMP hardware lets warehouse managers greatly increase the capacity of their systems without sacrificing the current Unix and database administration skills required to run it.

But for the truly *big* jobs, SMP is not enough. In those cases, some organizations are turning to MPP machines. Although SMP machines can handle up to 16 additional processors at a time, MPP systems incorporate the use of dozens or even hundreds of chips. The power of these machines cannot be approached by any other hardware on the market today. Unfortunately, this hardware requires a large investment in specialized software and support expertise.

APPLICATION FORM

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CRITERIA

Winners will be chosen by a panel of independent judges from among entrants who have submitted completed application forms to *CIO* by July 1, 1996. Entries will be judged on the following criteria:

- The extent to which the system adds business value in furthering the organization's strategic objectives
- The measurable financial return the system provides to the organization
- The extent to which IT was key to achieving the overall business solution—the “couldn't have done it without technology” factor
- The quality of collaboration between the business unit and IS organization that is achieved throughout the course of the project

Each finalist will be subject to an in-depth analysis of the nominated system (to be performed by *CIO* or its agents). This analysis, which may require a site visit, will be based on interviews with sponsoring executives and system users and will be designed to substantiate all claimed benefits. Notification of winners will occur in October 1996. *CIO* reserves the right to publish relevant cost and savings figures that establish the claimed ROI of the system; *the willingness to divulge this information for publication is a condition of entry.*

DEFINING VALUE

We invite applicants to consider the broadest possible spectrum of enterprise value. The following list of IT-enabled benefits is intended to help guide applicants' thinking:

- new, innovative and more productive ways of doing business;
- revamped organizational structures or styles of performing the work of the enterprise;
- the ability of the enterprise to enter a new market;
- successful global operation or expansion;

- transformation of the way the enterprise competes within its customary market or of the terms of competition within the market;
- improvement of the enterprise's relationships with its external customers;
- improvement of the enterprise's relationships with its own employees or among its functions (such as marketing, finance or human resources);
- the ability of the enterprise to compete more effectively by adding to the sum of its available knowledge assets;
- leaner and more economical operations.

ENTRY GUIDELINES

- The system must have been operational prior to July 1, 1994.
- Entrants must agree to be featured, along with their systems and organizations, in a *CIO* article.
- Entries must be complete.
- Entries must be on 8.5-by-11-inch paper, one side per sheet.
- The application form may be reproduced.
- Multiple entries from one company will be considered, but each entry must be submitted separately.
- Entries must be made jointly by the IS executive *AND* the business sponsor for whom the system delivers value.
- IT vendors, public relations and advertising companies, consultants and other third parties may *NOT* apply on behalf of another company. They are encouraged to forward this form to the “owner” of the system, or to contact *CIO* Communications to recommend that an application form be sent to the client.
- All entries must be computer generated or typed; no handwritten entries will be accepted.
- When feasible, an additional copy of the entry should be sent on a 3½ -inch disk. Electronic entries must be limited to word-processing and spreadsheet packages that are compatible with Microsoft Word and Microsoft Excel on a Windows or Macintosh platform.

1. COMPANY/BUSINESS UNIT

▲ NAME OF PARENT COMPANY

CITY, STATE WHERE HEADQUARTERS ARE LOCATED

PUBLICLY OR PRIVATELY HELD?

ANNUAL REVENUES

INDUSTRY

NAME OF BUSINESS UNIT OR ORGANIZATION

CITY, STATE WHERE LOCATED

NUMBER OF EMPLOYEES AT BUSINESS UNIT

2. ENTRANTS

A.

▲ NAME OF ENTERING I.S. EXECUTIVE

TITLE

NAME OF DIVISION, DEPARTMENT OR UNIT

ADDRESS

CITY

STATE ZIP

() ()

TELEPHONE FAX

B.

▲ NAME OF ENTERING BUSINESS-UNIT EXECUTIVE

TITLE

NAME OF DIVISION, DEPARTMENT OR UNIT

ADDRESS

CITY

STATE ZIP

() ()

TELEPHONE FAX

3. SUPPORTERS

Please list four people who are willing to be interviewed with regard to the system, its development, its use and the value returned. At least one should be a member of the technology team that developed the system and should have played a significant role. At least one should be a primary user from the sponsoring business unit. The other two may be from either organization or represent suppliers, customers or others intimately familiar with the system.

A.

▲ NAME

TITLE

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TELEPHONE FAX

REASON FOR INCLUSION

B.

▲ NAME

TITLE

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TELEPHONE FAX

REASON FOR INCLUSION

C.

▲ NAME

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▲ NAME

TITLE

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REASON FOR INCLUSION

DEADLINE:
JULY 1, 1996

MAIL TO:
ENTERPRISE VALUE AWARDS
CIO COMMUNICATIONS, INC.
492 OLD CONNECTICUT PATH
P.O. Box 9208
FRAMINGHAM, MA 01701-9208

4. THE NOMINATED ORGANIZATION

Please tell us about your organization (company, business unit, agency) in 500 words or less. Include information on:

- when the organization was founded;
- mission statement;
- major products and services;
- markets served;
- any other data you believe to be relevant in terms of general background.

5. THE NOMINATED SYSTEM

Tell us about the nominated system and demonstrate its importance to the organization by completing the following sections. Please limit your material to two pages.

SYSTEM DESCRIPTION: In one sentence or less, describe the system or IT initiative you are nominating (e.g., order-entry or document-management system; switch to a client/server architecture).

TECHNICAL PROFILE: Briefly describe the technology of the nominated system. Please include the names of major vendors and products. (NOTE: The examples provided here are meant to be illustrative, not all-inclusive.)

- **ARCHITECTURE** (e.g., client/server, mainframe)
- **HARDWARE** (e.g., mainframe/parallel processor, mini-computer/server, PCs, handheld devices)
- **SOFTWARE** (e.g., operating systems, database system, shells, application software)
- **SOFTWARE DEVELOPMENT TOOLS** (e.g., CASE, 4GLs, GUI developers, object-oriented development tools)
- **NETWORK/COMMUNICATIONS HARDWARE, SOFTWARE AND SERVICES** (e.g., modems, routers, e-mail packages, carriers and public networks)

6. BUSINESS IMPACT

Describe the primary business objectives of and value delivered by the IT investment. Please limit this section to five pages.

SCOPE AND IMPACT: Identify the functions (e.g., customer service, manufacturing, planning) that were changed by the system, the nature of those changes and their impact on the business.

STATEMENT OF VALUE: In one or two sentences, describe the business value delivered by the nominated system (please refer to "Defining Value" section on the first page of the application form).

BUSINESS VALUE DESCRIPTION: In detail, describe *how* the system delivers the value identified above. Also describe any added value delivered, whether intentionally sought or serendipitously encountered.

THE IMPORTANCE OF IT: Identify the different components of the overall business change (e.g., business reengineering, downsizing, cycle times). Explain the importance of the IT component to the overall business change. Could the results have been achieved without IT?

COLLABORATION: Describe how the business unit and IS organization worked together throughout the project, from concept to implementation. What were the specific tasks fulfilled by the business unit? The IS organization?

7. QUANTIFYING ROI

Provide a detailed, one-page summary of the nominated system's investment costs (including all upfront development expenses and annual maintenance charges). Also provide estimates of returns (including increased profits,

reduced costs and indirect cost-avoidance). Estimates of costs and returns should be made per annum over a five-year period.

8. TRUTH OF INFORMATION/RELEASE

The following release must be signed by both nominating executives if the application is to be considered. *Unsigned releases will invalidate the entry.*

I HEREBY STATE that the information provided is true and complete to the best of my knowledge and belief.

I AUTHORIZE the release and use of, in connection with the Enterprise Value Awards program, any and all materials furnished by me or others at the company contacted for this judging. I understand that information submitted on this application or subsequently gathered during the evaluation and judging process may be used in articles or any other type of publicity relating to the Enterprise Value Awards program.

I ALSO AUTHORIZE the release and use of my name, my company's name and my likeness, including but not limited to any photographs and any recording of my voice or image that may be taken of me for *CIO Magazine*. I agree that no compensation shall be due me or my company for such usage.

I RECOGNIZE that failure to meet these conditions or to provide sufficient material that can be published can cause the application to be rejected at any point in the process at the sole discretion of the sponsors.

1.

▲ SIGNATURE OF NOMINATING I.S. EXECUTIVE

DATE

2.

▲ SIGNATURE OF NOMINATING BUSINESS EXECUTIVE

DATE

9. OTHER EDITORIAL OPPORTUNITIES

If you are not selected as an award recipient, are you willing to be contacted for inclusion in other articles in *CIO Magazine*? YES ☐ NO ☐

How did you learn about the Enterprise Value Awards program?

- | | |
|---|--|
| ☐ CIO MAGAZINE | ☐ ACADEMICIAN |
| ☐ CONSULTANT | ☐ IS STAFF MEMBER |
| ☐ SYSTEMS INTEGRATOR | ☐ OTHER PUBLICATIONS |
| ☐ PR AGENCY | ☐ VENDOR |
| ☐ ADVERTISING AGENCY | ☐ OTHER (PLEASE IDENTIFY) |

CHECKLIST

HAVE YOU FILLED OUT...?

- ☐ Company/Business-Unit, Entrants and Supporters Information

HAVE YOU INCLUDED ON SEPARATE PAGES...?

- ☐ Nominated Organization
- ☐ Nominated System
- ☐ Business Impact
- ☐ Return on Investment

HAVE BOTH ENTRANTS SIGNED AND DATED...?

- ☐ Truth of Information/Release

HAVE YOU CHECKED OFF...?

- ☐ Other Editorial Opportunities
- ☐ How you learned about the Enterprise Value Awards program?

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SCULPTURE BY DAVID SHAPIRO; PHOTO BY RALPH MERCER

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1. A return of value to the enterprise (see "Defining Value" within this application)
2. A measurable financial return attributable to the system
3. The pervasiveness of information technology—in other words, the strategic objective could not have been met without IT's contribution
4. Collaboration between an IT and business executive

If your innovative solution meets the above criteria, please fill out this Enterprise Value Awards application form. The Feb. 1, 1997, issue of *CIO* will feature profiles of the winning organizations and the executives who have proved that their strategic technology investments have had a positive and sustained impact on enterprise value.

In February 1997, *CIO* will host a special awards ceremony honoring the Enterprise Value Award winners at the annual CIO Enterprise Value Retreat.

For more information, please contact Lisa Kerber at (508) 935-4449.

ENTERPRISE VALUE AWARDS TIMELINE

APPLICATION DUE: July 1, 1996

JUDGES SELECT WINNERS: October 1996

WINNERS ANNOUNCED: October 1996

AWARDS CEREMONY: Feb. 2-5, 1997
at the CIO Enterprise Value Retreat

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Jeffrey Otten
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Access Products

By far the widest range of unique products can be found in the area of user access, sometimes referred to as data mining. These products can be broken down into six categories:

1. Intelligent Agents and Agencies. These products and features work and think for the user. They make it possible for a business person to ask the system to check on things, automatically send reports and monitor the status of various business functions. Users fill out the appropriate screens, and intelligent software agents go out and do the work.

2. Query Facilities and Managed Query Environments. Unlike the overly simplistic or nonintuitive report writers of old, these tools turn a large, complex data warehouse environment into a friendly, well-managed workstation.

3. Statistical Analysis. One of the biggest surprises in the data warehousing marketplace is the resurgence of interest in traditional statistical analysis and a concomitant resurrection of the popularity of products like SAS and SPSS.

4. Data Discovery. A lot of attention has been given recently to a large group of products formerly classified as decision support, artificial intelligence and expert systems but now categorized as data discovery products. Making use of neural networks, fuzzy logic, decision trees and other tools of advanced mathematics and statistics, these products allow users to sift through massive amounts of raw data to "discover" new, interesting, insightful and in many cases useful things about the company, its operations and its markets. Some of the biggest users of data discovery tools are marketers, who rely on them to understand better who the company's customers are and how they can be better served, and credit/insurance departments, who use artificial intelligence to detect fraud and find good credit risks. A recent search on the Internet revealed no fewer than 57 different data discovery products for business analysis.

5. OLAP. The online analytical processing (OLAP) or multidimen-

**A SAMPLING OF DATA WAREHOUSING
ACCESS PRODUCTS AND VENDORS**

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Information Advantage
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.....
DSS Agent Microstrategy Inc.
800 927-1868
.....
Forest & Trees Platinum Technology Inc.
800 442-6861
.....

MANAGED QUERY ENVIRONMENTS
Business Objects Business Objects Inc.
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.....
Forest & Trees Platinum Technology Inc.
800 442-6861
.....

STATISTICAL ANALYSIS
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919 829-9033
.....
SPSS SPSS Inc.
800 543-9262
.....

DATA DISCOVERY
IDIS:3 Information Discovery Inc.
310 937-3600
.....
ModelMAX Advance Software
Applications Corp.
412 429-1003
.....

OLAP
DSS Agent Microstrategy Inc.
800 927-1868
.....
DecisionSuite and WebOLAP
Information Advantage
612 820-0702
.....
Essbase Arbor Software Corp.
800 858-1666
.....
Red Brick Warehouse Red Brick Systems
408 399-3200
.....

DATA VISUALIZATION
MapInfo MapInfo Corp.
518 285-6000
.....
SOURCE: ROB MATTISON

sional spreadsheet tools represent a whole new generation of high-powered, user-friendly data investigation systems. These systems, sometimes referred to as spreadsheets on steroids, enable people to look at information from dozens of different perspectives. The main strengths of OLAP products are their ability to dynamically slice and dice reports and to look at the same kinds of in-

formation at different levels at the same time. A typical OLAP application might allow a product manager to view sales figures for a given product at the national level, see them broken down by division, drill down to see figures for territories within a division, check sales numbers for each store in a territory and then compare them against sales of stores from a different territory—all at the push of a button.

6. Data Visualization. The final and most glamorous of the access products are those that concentrate on data visualization. These tools turn ugly, boring numbers into exciting visual presentations. While many products in the other categories have visualization capabilities, the "viz" tools bring graphical representation to new heights. Probably the most popular visualization tools fall under the heading of geographical information systems. Such systems turn data about stores, individuals or anything else into compelling, easy-to-understand, dynamic maps.

Support and Integration

Of course, each of these products contributes only a part of the overall warehouse development picture. To build a warehouse for your own organization, you must assemble a unique collection of these tools and perhaps combine them with your own customized software in order to tie the different pieces into a coherent, whole system. Because that can be a daunting task, many organizations have found warehouse support and integration services helpful.

"Integrated" solutions from vendor partners in different categories usually involve some combination of software (and sometimes hardware) and almost always include a large fee for consulting services. The challenge in purchasing these "packages" lies in figuring out exactly how much of the package is pre-integrated software and hardware, what constitutes "normal" installation and setup, and how much time the vendor will devote to the development of a unique, custom solution. Most important is finding out what the vendor is *not*

going to do. (It is not uncommon to find integrated solution offerings wherein the vendor agrees to do all of the easy tasks and leaves it up to the customer's IS department to figure out what else needs to be done and how to do it.)

How Much Should It Cost?

The cost of developing a warehouse application can vary significantly. Some frugal organizations have started warehousing efforts for as little as \$50,000 by leveraging a lot of existing hardware, software and personnel.

Others have spent millions. The more expensive warehousing ventures involve major new hardware acquisitions and significant investments in training, analysis and systems development costs. The price tag really depends on what you are trying to build and how you go about it.

A typical startup warehouse project allocates more than 60 percent

Scrutinize the offerings of vendors and systems integrators to understand which functions they'll provide and which you'll have to build yourself.

of its budget for hardware and software to the creation of a powerful storage component, spending just 30 percent on data mining and user access technologies.

Budgeting for systems analysis and development, however, follows a very different pattern. More than 50 percent of development dollars are spent on building acquisition capabilities, 30 percent fund the development of user solutions and 20 percent are dedicated to the creation of databases in the storage component.

If you aren't already involved in the development of a data warehouse, odds are that you will be soon. As you decide whether to build one of your own, clarify what you want to do with your warehouse and how it will be used. Then scrutinize the offerings of vendors and systems integrators. Make sure you understand which functions they intend to provide and which you will have to build yourself. Finally, remember that most successful projects start as small, tightly defined, tactical systems designed to meet specific, pressing business needs. The large-scale warehouse should grow over time. **CIO**

Rob Mattison is a senior consultant for dbINTELLECT Technologies, a division of EDS. He is the author of Data Warehousing: Strategies, Tools and Techniques (McGraw-Hill Inc., 1996). He can be reached at 70451.207@compuserve.com.

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Sticky with Ubiquity

Rare is the computer screen that has never been wreathed by sticky notes bearing oh-so-urgent reminders. Now 3M, the creator of Post-it Notes, has come up with the 267th iteration of the best-selling office product. Post-it Software Notes lets users replicate the ease and informality of sticky notes on—instead of around—the computer desktop. The electronic version offers several benefits over its paper cousin.

The Windows-based software borrows Post-it Notes' familiar format, enabling users to click on a note pad icon—which is always accessible from within all applications—to type a note. The notes look like paper Post-it Notes; in fact, beta testers persuaded developers to eliminate scroll bars on the edges of notes to preserve the simplicity of the original. Users may set alarm reminders and can send their notes to others as e-mail via cc:Mail or Microsoft Mail. Windows 95 users can attach notes to documents; if other users don't have the Post-it software, the notes appear in bitmapped form. Users can leave notes on their desktops or set up customized memo boards to organize their notes and reminders. Notes, memo boards and



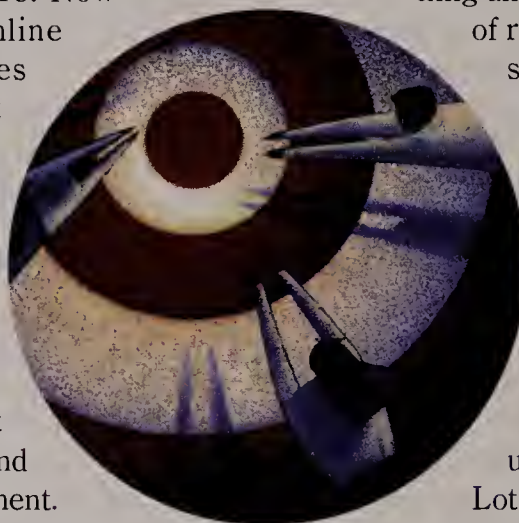
alarm lists may be printed, and a find function allows keyword searches.

Launched in March, Post-it Software Notes is available in Windows format only and requires 4MB of RAM for Windows 3.1 and 8MB of RAM for Windows 95. The list price is \$24.95. For more information, call 800 330-3966.

The Right Staff

As Fortune 1000 companies downsize, outsource and look for personnel with new and nontraditional skill sets, human resources deployment becomes a practical and logistical nightmare. Now companies can streamline their staffing processes with Restrac's product suite, Restrac Enterprise. Restrac's automated staffing solution addresses all facets of corporate staffing, external hiring, internal redeployment, succession planning, contingent and temporary staffing and employee skills management.

The Restrac Enterprise product suite's three systems work independently or together as a total staffing solution. Restrac Hire combines resume scanning and workflow capabilities to speed the hiring process and better match candidates to positions. Restrac Plan automates succession planning and skills management, and Restrac Temp streamlines temporary and con-



tract staffing. The systems integrate with RDBMSs from Oracle Corp., Sybase Inc. and Gupta Corp. Enabling technologies behind Restrac Enterprise include optical scanning and imaging for the storage

of resumes, full-text resume searching for defined experience and skill sets for applicant/employee job matching, workflow and client/server architecture. Restrac products provide electronic links between HR staffing professionals, applications and line managers using the Internet, e-mail, Lotus Notes, kiosks and other

systems. Restrac Enterprise sys-

tems run under Windows on client/server platforms ranging from 486-class personal computers to midrange systems such as AS/400s. Configuration costs can range from \$50,000 to more than \$1 million, varying with the level of staffing automation needed and the number of users. For more information, call Restrac at 617 320-5630.

Hafta NAFTA?

Complying with NAFTA Rules of Origin is not exactly a day at the Acapulco beach. At first glance, the rules seem simple enough—only goods that originate within a NAFTA country are eligible for preferential tariff treatment. But complex changes in tariff classifications, depending upon how much a product is transformed from its constituent materials and components into the finished goods, prevent many companies from taking full advantage of current trade regulations. Failure to follow the Rules of Origin can cost a company up to \$100,000 in penalties. Nifco Synergy Ltd.'s Windows-based software program, Origin Basic, can help companies analyze NAFTA Rules of Origin and exactly how they affect individual products.

Origin Basic guides international traders through all the steps necessary to obtain preferential tariff status under NAFTA for their finished goods. The program produces a detailed audit trail that clearly outlines the logic used to secure this special class of duty treatment. For those products that fail to qualify, Origin Basic highlights the trouble spots so that manufacturers can explore options that will enable them to qualify in the future. The pivotal component of Origin Basic is a comprehensive NAFTA database through which companies can search for harmonized standard code via a keyword search to find the corresponding NAFTA Tariff, Most Favored Nation and General Preferential Tariff rates. Companies can also import relevant information from their own Bill of Materials as the basis for generating an Origin Basic determination. In addition, Origin Basic enables them to create, store, retrieve and print NAFTA Certificates of Origin.

Origin Basic sells for \$6,995 per five-user license. An upgrade program is available for current customers. For more information, visit Nifco Synergy's Web site at <http://www.nifcosynergy.com>.



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List Services Manager

STEPHANIE LEGELIS
508 935-4433

List Services Assistant

KATE DAVEY
508 935-4072
CIO Communications Inc.
492 Old Connecticut Path, PO Box 9208
Framingham, MA 01701-9208
508 872-0080, FAX 508 872-8506

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G E N U I N E R E P R I N T S F R O M



My Data Warehouse

We profit from your excess!

BY TRIPP STRANGE

I have been a CIO, a consultant, an early Internetnik and a minor government apparatchik in the dour Republican revolution to exalt as a shared American vision the value systems of William Randolph Hearst, P.T. Barnum and Andrew Carnegie. It has all been bracing. But now I've found something that really suits me. Something that combines my flair for the cutting edge and my sheer love of, well, other people. I'm here in Tallahassee now, not far off Interstate 10, running the world's largest data warehouse. Maybe you've heard of it. Maybe you've seen the big rooftop sign: "Bits Galore!" There's the big inflated computer bulging at the seams with information and looking a lot like Fred Flintstone after a few too many brontoburgers.

I knew this data warehouse stuff was going to be big. The world has been bingeing with Fred on databurgers, and now there's a massive case of indigestion. Organizations are crammed to the rafters with records and files, fields, points and entries. It's vastly unusable and chaotic. It's like every company has this same musty attic of crud dispersed across all its functions, slowing down the decision support and sowing confusion and error everywhere it reaches.

A little bit of knowledge may be a dangerous thing, but too much information is a full-blown disaster! That's why we're here. Give us your tired, your poor, your huddled masses of data yearning to breathe free! We'll clean it and stack it and keep it in the manner to which it deserves to be accustomed. Do we care if it's relational or flat? No! Do we care if it's object-oriented? No! We don't discriminate among disparate databases; we love them all equally.

That's our pitch, anyway. And it



seems to be working. We get lots of inquiries from overwhelmed CIOs wanting to outsource their data management. At least, that's what they say they want. But our underlying business premise is that familiar (and unfairly maligned) maxim of denial, "Out of sight, out of mind." We're here to provide a reasonable assurance to our customers that their data will retain either its pristine integrity or its charming discombobulation until they figure out something productive to do with it. It's like those cryogenics places where they freeze dead people's bodies until the cure for whatever killed them is found. That's us—happily biding our time until the end of information overload!

We use Standard & Poor's industry classifications to create our happy little data streets and neighborhoods. We keep all the insurance company records together, all the hospitality, all the aerospace, all the automotive, all the test and measurement equipment makers, and so forth. And, at my direction, we've recently inaugurated use of the Dewey Decimal System, a time-tested organization method widely used by libraries. Vince, the warehouseman, was pushing for barcodes, but I

showed him a study done in the late 1970s that clearly established an unacceptably high error rate for scanning technologies.

Vince is my human disaster-recovery plan. If one of the tall steel filing racks gets overloaded, causing the struts to buckle and spill stuff off the shelves, Vince is right there to pick up the pieces. If I've got the time, I'll help him myself. And there we'll all be, down on our hands and knees sorting through the spilled reels of tape and optical disks and streaming cartridges, trying to figure out which ones go in what boxes while staying in constant touch with the rightful owners of the data (who couldn't seem to care less).

We also have a group of kids from the local pest-control school who come in on a regular basis to help deal with the rodent problem. (Customers might not cotton to the idea of rats in the data archives.) They're testing out new, supposedly humane methods of dispatching our furry little buddies. The floors and sills are festooned with innovative little traps and electric impale-a-trons and sizzlers. The odors of advanced decomposition and partial sauteing fill the cavernous spaces and make me happy as hell that I'm in a business where the customers don't ever drop by for a visit.

I'm pretty stoked about this data warehousing business, and I can't imagine wanting to do anything else in the foreseeable future. For us it's been a license to print money. But you can bet we don't keep the money in the warehouse; we keep it in a Cayman Islands bank where it'll *really* be safe—and where the rodents are a cut above. **CIO**

April Fool! Tripp Strange is a fictitious former CIO who lives in Tallahassee, Fla., and regrets most of what he has done during the past decade.

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